

# A Systematic Study of *Flourensia* (Asteraceae, Heliantheae)

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## Abstract

*Flourensia* DC. (Asteraceae, Heliantheae) is composed of glutinous subshrubs, shrubs, and small trees occurring primarily in arid habitats in the American subtropics. The genus has an amphitropical disjunct distribution, with 13 North American and 18 South American species. Extensive field studies were conducted throughout the range of the genus. Morphological, cytological, and phytochemical studies were utilized in determining generic and species relationships. Descriptions, illustrations, distribution maps, and a key to species are presented. [Key words: *Flourensia*, Asteraceae, morphology, cytology, amphitropical disjunct distribution, monograph.]

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## Introduction

As treated in this study,<sup>1</sup> *Flourensia* is composed of glutinous subshrubs, shrubs, and small trees occurring mostly in drier, elevated regions of North and South America. The genus has an amphitropical distribution (fig. 1), with 13 North American taxa, primarily Mexican (of which two, *F. cernua* and *F. pringlei*, enter the southwestern United States), and 18 South American taxa associated with the Andean Cordillera of Peru, Bolivia, Chile, and Argentina.

Since the revision of *Flourensia* by Blake (1921), eight new species have been described, four from

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<sup>1</sup> Based on a doctoral dissertation submitted to the Graduate School of the University of Texas at Austin.

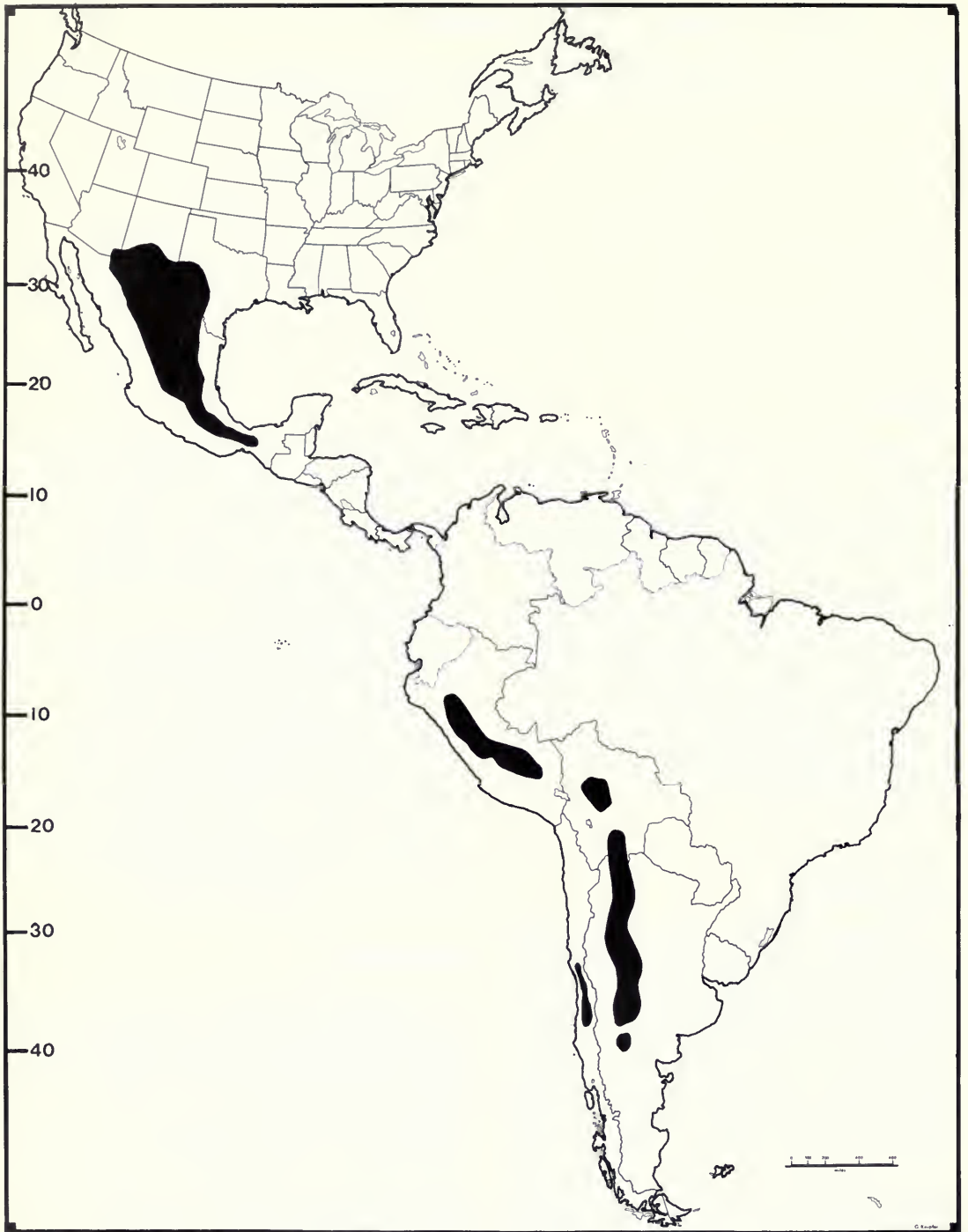


FIG. 1. Distribution of the genus *Flourensia*.

north-central Mexico, two from Argentina, and two from Peru. Many unidentified collections have been added to herbaria over the last 60 years. For

these reasons, a re-examination of the genus was desirable.

In connection with the present study, extensive

field collections and ecological observations were made throughout the range of the genus in North and South America. Approximately 1,500 herbarium specimens were examined from the major herbaria of North and South America. In attempting to establish species relationships, data were used from morphological, cytological, ecological, and phytochemical investigations.

## Taxonomic History

*Flourensia* was erected by DeCandolle (1836) to include four species: two Mexican discoid taxa, *F. laurifolia* and *F. cernua*, and a radiate group in Chile composed of *F. thurifera*, which was originally described by Molina (1782) as a *Helianthus*, and *F. corymbosa*.

Bentham (1873) submerged the genus under *Helianthus*, stating that *Flourensia thurifera*, *F. cernua*, and *F. laurifolia* do not differ significantly from *Helianthus*, other than having villous achenes and resinous leaves. He removed *F. corymbosa* to *Viguiera* due to the presence of well-developed squamellae between the pappus awns.

Gray (1873) treated *Flourensia* as distinct from *Helianthus* and agreed with Bentham in the placement of *F. corymbosa* in *Viguiera*. In 1879, Gray described *Encelia microphylla* from north-central Mexico and stated, "[It] has shrubby stems, foliage not unlike that of *Flourensia cernua*, and the relationship of the two is apparent." Later (1883), Gray suggested that the discoid taxa (i.e., *F. cernua*, *F. laurifolia*) were typical for *Flourensia* and that the radiate *F. thurifera* might be best treated as a section under Cassini's *Diomedia*. Gray incorrectly attributed the authorship of *Diomedia* to Bertero and Colla.

Baillon (1886) submerged *Flourensia*, *Wyethia*, *Tithonia*, *Diomedia*, and *Viguiera* into *Helianthus*, thus creating a highly variable and, I presume, polyphyletic assemblage. Hoffmann (1894) reinstated *Flourensia* as a distinct genus, and it has been retained by nearly all subsequent authors.

Blake (1913) began work on the genus during a revision of *Encelia*, at which time he transferred six radiate taxa from *Encelia* (*E. collodes*, *E. glutinosa*, *E. microphylla*, *E. oblonga*, *E. resinosa*, and *E. suffrutescens*) to *Flourensia*, and also described *F. retinophylla* from Coahuila, Mexico. In 1916, he described two new South American species, *F. macrophylla* and *F. fiebrigii*. In 1918, during a revision of *Viguiera*, Blake established *F.*

*heterolepis* and transferred several taxa previously included in *Flourensia* (*F. atacamensis*, *F. corymbosa* var. *araucana*, *F. c.* var. *lanceolata*, *F. gayana*, *F. hispida*, and *F. navarri*) to *Viguiera*.

Blake (1921) published a revision of *Flourensia*, in which five new species from Argentina were described: *F. hirta*, *F. leptopoda*, *F. niederleinii*, *F. oolepis*, and *F. polyclada*. He subsequently described three additional species: *F. hirtissima* from Argentina in 1924, *F. dentata* from Mexico in 1935, and *F. solitaria* from Mexico in 1950.

In 1960, Seeligmann described *F. macroligulata* from northern Argentina. The last additions to the genus have been two species from north-central Mexico, *F. pulcherrima* and *F. monticola* (Dillon, 1976), and three species from South America, *F. blakeana* from Argentina and *F. polycephala* and *F. peruviana* from Peru (Dillon, 1981).

## Cytological Studies

Prior to the present study, only four chromosome counts for *Flourensia* were reported in the literature. Turner & Johnston (1961) reported meiotic counts of  $n = 18$  pairs for the Mexican species *F. laurifolia* and *F. resinosa*, Di Fulvio (1977) reported a meiotic count of  $n = 18$  pairs for *F. campestris* of Argentina, and Strother (1983) reported a meiotic count of  $n = 18$  for the Mexican species *F. collodes*. Dr. Michael Powell (pers. comm.) found  $n = 27$  univalents in one collection of *F. cernua* from Coahuila, Mexico. In the present study, counts were made in 28 populations representing 14 species, 10 of which are South American, and four, North American (Dillon, 1976). Vouchers are on deposit at TEX and marked with an asterisk (\*) in citations of representative species.

Field-collected bud material was fixed in modified Carnoy's solution (chloroform: absolute ethanol: glacial acetic acid, 4:3:1, v/v/v), and chromosome squashes were stained in aceto-carmine. A mitotic chromosome count of  $2n = 36$  for *Flourensia thurifera* was determined from root tips of laboratory-germinated achenes.

*Flourensia* appears to be monobasic with  $x = 18$ . Chromosome counts are known for only 17 of the species, but all counts to date have been  $n = 18$ . This relatively high base number is characteristic of other genera considered most closely related to *Flourensia* (see **Generic Relationships** section).

As noted, a meiotic count of 27 univalents has

been reported for *Flourensia cernua*. However, pollen fertility of the voucher was determined as 99% (more than 500 grains examined). Thus, it appears that nonchiasmatic meiotic figures do not adversely affect fertility. Because none of the other populations of *F. cernua* sampled throughout its range exhibited univalents, it is assumed that such irregularities are relatively rare.

## Morphology

Species of *Flourensia* are delineated through combinations of qualitative and quantitative characters. The following section explains how various measurements (reported in the descriptions) were made and the extent of their utility in the circumscription of taxa.

### Leaves

All leaf measurements are for the blades only. Petiole measurements are given separately. Leaf size, shape, and degree of denticulation tend to be quite uniform within most taxa. This usually allows species to be recognized in the sterile condition.

Leaves of various species exhibit characteristics that presumably confer drought resistance and allow them to inhabit arid environments. Well-developed cuticles and resinous exudates are usually present on leaf surfaces. Many species are drought-deciduous, with the extent of leaf loss dependent upon the length and severity of drought periods. In *Flourensia thurifera* of central Chile, the only species to be studied in detail, the leaves gradually dry up as drought progresses until there are only a few terminal leaves remaining (Mooney & Kummerow, 1971).

### Capitulescence

In most species of *Flourensia*, the capitula are arranged into determinate, secondary cymes. These are in turn occasionally arranged into panicles or racemes. Solitary capitula, terminating stems or branchlets, are most common among the many-rayed taxa, but may also be found in discoid species (e.g., *F. solitaria*).

### Capitula

The height of the capitula was measured from the base of the involucre to the top of the disc

florets. The width measurements exclude the ray florets and represent the width of the involucre only. Capitular size is somewhat variable within and between individuals; however, some species with similar leaf morphologies can be distinguished by their capitular size.

The capitula can be grouped into two categories based upon the presence or absence of ray florets: (1) Discoid taxa possess capitula with only tubular, 5-lobed corollas. This developmental suppression of ray florets has occurred within six species, all of North America. The loss of rays in usually radiate genera is not uncommon among many members of the Heliantheae. *Encelia*, *Viguiera*, *Enceliopsis*, and *Geraea*, among others, all possess discoid taxa, while their members are predominantly radiate. Obviously such loss is not selectively disadvantageous; discoid *Flourensia* have been quite successful in occupying a wide range of xeric environments (e.g., *F. cernua*).

(2) The radiate taxa possess capitula with typical disc florets surrounded by ray florets with well-developed ligules. Within this category, two additional groups can be separated on the basis of the number of ray florets: In one line, an actinomorphic pattern is presented where members have more than eight (8) rays, usually a Fibonacci number (i.e., 13, 21, etc.). In the other, a pleiomorphic or numerate pattern is presented where members have five (5) or eight (8) rays, but occasionally as many as 10 or as few as four (4). Specialization in the number of ray florets is considered to be a response to pollinator selection, for these taxa display patterns that mimic pleiomorphic "true" flowers (Leppik, 1970).

### Phyllaries

Involucres are quite diagnostic, with phyllary size, shape, and vestiture being uniform within most species. The phyllaries are normally imbricate in two to five series and less often equal or subequal. In a few species, e.g., *Flourensia pringlei*, the outer phyllaries are long and overtop the inner ones. The phyllaries of each series are usually differentiated in size and shape. Most are herbaceous, or only basally indurate, and tend to become reflexed at maturity. One exception is *F. solitaria*, which has phyllaries that are mostly indurate, persistent, and remain erect at maturity.

### Achenes

The achenes are usually obconical, laterally compressed, thickened, and sericeous, at least on

the margins. They range from 6 to 12 mm long, and considerable variability can be found among members of the same population. All have a pappus of two (rarely three or four) aristiform, setose awns arising from the thickened margins. The only exception is *F. solitaria*, which has nearly terete achenes that lack a pappus and obvious pubescence.

*Flourensia* taxa lack paleaceous squamellae such as occur in many *Viguiera* and *Helianthus*. However, the bases of the awns can be strongly amplexate and deeply lacerate and often united to form a lacerate corona between the awns (e.g., *F. ilicifolia*, *F. collodes*, *F. thurifera*, *F. oolepis*). This pappus condition is also exhibited by some *Viguieras*.

## Generic Relationships

While all authors since Hoffmann (1894) have recognized *Flourensia* as a distinct genus, there has been little agreement upon its subtribal placement. Hoffmann (1894) placed *Flourensia* within Verbesininae, between *Lipochaeta* and *Spilanthes* (s.l.). These two genera are here considered quite distant from *Flourensia*.

Blake (1913, p. 350) considered the following genera to be related and provided a key for their discrimination: *Flourensia*, *Helianthus*, *Viguiera*, *Simsia*, *Encelia*, *Enceliopsis*, *Geraea*, *Helianthella*, and *Verbesina*. In this revision of *Flourensia*, Blake (1921) made no mention of possible generic relatives other than to point out the differences between it and *Helianthus* and *Viguiera*.

Stuessy (1977) included *Flourensia* within Helianthinae, based on the following characteristics: (1) alternate-leaved shrubs, (2) neuter ray florets and fertile disc florets, (3) conduplicate paleae, and (4) convex receptacles.

Robinson (1981) re-delineated the subtribes of Heliantheae and placed *Flourensia* within his "Encelia group" in Ecliptinae (a prior name for Verbesininae). This group included *Encelia*, *Enceliopsis*, *Flourensia*, *Geraea*, and *Phoebanthus*.

During my examination of the genera that had been considered close relatives of *Flourensia*, the only genus that could be considered related is *Encelia*. The morphological characteristics that distinguish these two genera are summarized in Table 1.

In addition to these morphological differences, the two have quite different eco-geographical distributions. The center of diversity of *Flourensia*

TABLE 1. Morphological comparison of *Flourensia* and *Encelia*.

Character	<i>Flourensia</i>	<i>Encelia</i>
Habit	Subshrubs, shrubs, and small trees	Scapose or small shrubs
Leaves	Usually subglabrous and resinous	Usually canescent resin not obvious
Ray florets	Bi-denticulate	Tri-denticulate
Disc florets	Yellow	Yellow or purple
Paleae	Coriaceous or indurate	Soft or scarious
Achenes	Thickened to plump, sericeous (at least margins)	Compressed, very flat, villos on margins, faces usually glabrous
Pappus	2-3(-4) aristiform awns	Absent, or rarely of 2 awns
Style branches	Broadly to narrowly acute appendages	Short obtuse appendages

in North America is within the Chihuahuan Desert region of central Mexico and in South America in the Andean Cordillera. In contrast, *Encelia* has its center of diversity in arid regions of the western United States and adjacent Baja California, Mexico (chiefly the Sonoran Desert). Two species occur in scattered coastal localities in Chile and Peru. One species is endemic to the Galapagos Islands. This suggests the quite different edaphic and physiological requirements of these genera.

*Flourensia* has a probable base chromosome number of  $x = 18$ , all counts thus far being  $n = 18$  (see **Cytological Studies** section). Of the genera considered close to *Flourensia*, only *Encelia* ( $n = 17, 18$ ), *Enceliopsis* ( $n = 17, 18$ ), and *Geraea* ( $n = 18$ ) share this number. The last two genera are morphologically and geographically distinct from *Flourensia*.

Phytochemical data have been useful in the delineation of generic groupings within certain subtribes of Asteraceae (Seaman, 1982). Although a thorough survey is lacking, present data indicate that *Flourensia* elaborates a unique array of sesquiterpenes and triterpenes (Kingston et al., 1975; Estrada et al., 1965; M. Aregullin, pers. comm.), polyacetylenes (Bohlmann, pers. comm.), and flavonoids (Dillon et al., 1976; Dillon & Mabry, 1977; Rao et al., 1970). Further analysis of taxa within this genus and elsewhere within the tribe will be necessary before emphasis can be placed upon these data.

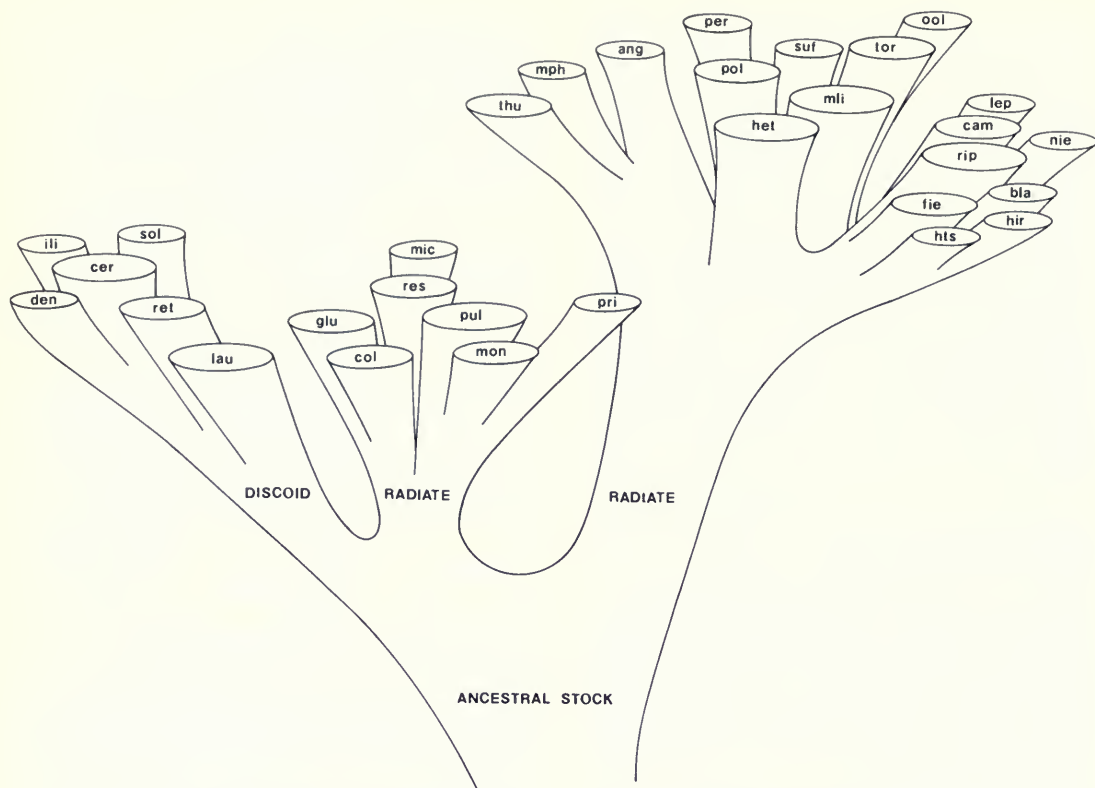


FIG. 2. Species relationships among *Flourensia* species. Key to abbreviations: ang = *F. angustifolia*; bla = *F. blakeana*; cam = *F. campestris*; cer = *F. cernua*; col = *F. collodes*; den = *F. dentata*; fie = *F. fiebrigii*; glu = *F. glutinosa*; het = *F. heterolepis*; hir = *F. hirta*; hts = *F. hirtissima*; ili = *F. ilicifolia*; lau = *F. laurifolia*; lep = *F. leptopoda*; mic = *F. microphylla*; mli = *F. macroligulata*; mon = *F. monticola*; mph = *F. macrophylla*; nie = *F. niederleinii*; ool = *F. oolepis*; per = *F. peruviana*; pol = *F. polycephala*; pri = *F. pringlei*; pul = *F. pulcherrima*; res = *F. resinosa*; ret = *F. retinophylla*; rip = *F. riparia*; sol = *F. solitaria*; suf = *F. suffrutescens*; tor = *F. tortuosa*; thu = *F. thurifera*.

An examination of available data indicates that *Flourensia* is a natural assemblage of taxa that lacks close generic relatives, with the exception of *Encelia*. While subtribal classification within Heliantheae is being debated, the position of *Flourensia* near the aforementioned genus is clear.

## Species Relationships

Efforts to establish species relationships within *Flourensia* have been made more difficult by the parallel development of various character states in both North and South American taxa. In this study, species groupings have been made primarily through the comparison of exomorphic features. Capitular morphology, including the size and shape

of phyllaries, and the presence and number of ray florets were considered most important in the delineation of groups. Secondly, characters such as leaf size and shape, pubescence, capitulescence type, ecological preferences, and geographical locality were considered. In addition, data from phytochemical studies were helpful in inferring affinities between various taxa. The results of the phytochemical studies will be presented in a future publication.

Figure 2 represents the interspecific relationships within the genus as suggested by these data. The presumed relationships within North American taxa will be discussed first, followed by those of South American taxa. Finally, consideration will be given to the possible origin of the amphitropical distribution of the genus.

Two groups can be distinguished in North

America by the presence or absence of ray florets. This character is constant within any given species. All the radiate species occur at higher elevations, usually in arid, montane sites. *Flourensia monticola*, *F. pulcherrima*, and *F. pringlei* form one line within the radiate taxa. They possess large capitula, usually solitary at the tips of branchlets, and have 13–21 ray florets. Their involucre is composed of large, foliaceous phyllaries that equal or overtop the disc.

*Flourensia resinosa*, *F. collodes*, and *F. glutinosa* form another line, which is characterized by possessing small capitula with 8–13(–16) ray florets and cymose capitulescences. Their involucre is composed of small indurate phyllaries that tend to be imbricate and not overtopping the disc.

*Flourensia microphylla* represents a highly reduced radiate type, which shares characteristics with the discoid taxa (e.g., reduced habit and small leaves). The relationships of this rare species are unclear at present; however, capitular morphology suggests ties with *F. resinosa*.

The six discoid species are considered to form a monophyletic group derived from now extinct radiate stock resembling *Flourensia collodes* or *F. glutinosa*. All discoid taxa occur within the Chihuahuan Desert Region, with the exception of *F. laurifolia* of the Tamaulipan thorn scrub. *Flourensia laurifolia*, *F. retinophylla*, and *F. cernua* form one line, which appears to be a reduction series in response to increasing aridity in their respective environments. *Flourensia solitaria*, *F. ilicifolia*, and *F. dentata* are each rather isolated, primitive derivatives from the *F. cernua* line. *Flourensia ilicifolia* and *F. dentata* are the only North American taxa that lack entire leaves.

Three weakly differentiated lines can be recognized among the South American taxa. *Flourensia macrophylla*, *F. angustifolia*, *F. peruviana*, and *F. polycephala* are all distributed within the Andes of northern to southern Peru. They share similar capitulescences, capitular morphologies (8–13 ray florets), and ecological preferences. *Flourensia thurifera* of central Chile is clearly related to this line through *F. macrophylla*; both have similar leaves and involucre.

*Flourensia suffrutescens*, *F. tortuosa*, *F. macroligulata*, and *F. oolepis* form a line characterized by large capitula with broad phyllaries and 13–21 ray florets. *Flourensia heterolepis* appears transitional between this group and the last and is most closely related to *F. polycephala*.

The remaining eight species are all closely related and share many characters, including similar

capitulescences and capitular morphologies. These taxa are distributed from southern Bolivia to southern Argentina and share similar ecological preferences. *Flourensia riparia*, *F. campestris*, *F. leptopoda*, *F. niederleinii*, *F. hirta*, *F. fiebrigii*, and *F. blakeana* all exhibit a trend toward fewer ray florets, with the majority of species possessing 5–8 ray florets. *Flourensia hirtissima*, with solitary capitula, most closely approaches some individuals of *F. fiebrigii* and is probably a product from that line. This lineage is clearly related to the previous one, but tends to occupy more arid environments at lower elevations. *Flourensia riparia* seems basal within the line and shares habit, foliar, and capitular characteristics with *F. heterolepis*.

The two hemispheres contain comparable numbers of taxa, 13 North American and 18 South American. No single species is disjunct between continents. Despite their mutual cohesion, there are parallel trends among the species on both continents, including similar growth forms, leaf shapes, capitula, and achenes. *Flourensia* can be classified as an example of a generic allodisjunction (Turner, 1972), for the taxa concerned are widely separated spatially and appear to have been derived through phyletic divergence from populations now extinct.

How did *Flourensia* attain its present amphitropical distribution? There is a gap in its range of approximately 1,500 km from Chiapas, Mexico (ca. 16°N lat.), to northern Peru (ca. 8°S lat.). Geomorphic evidence indicates that the continuous land bridge in Middle America is of recent origin (Raven & Axelrod, 1975) and has probably not acted as a corridor for widespread migrations of xeric elements between North and South America. The opportunity for this has been greater in recent times than at any period in the past. The northernmost distribution of *Flourensia* in South America is just south of the Huancabamba Deflection in northern Peru. Simpson (1975) has pointed out that this area is lower than many inter-Andean valleys and that it has acted as a significant barrier to north-south land migration since early times.

If *Flourensia* had been previously more widespread within the tropics, one would expect to find the genus represented in appropriate habitats in deep valleys and basins in north-central Guatemala and central Honduras. These areas, due to rain-shadow effects, receive relatively scant precipitation and exhibit dry tropical scrub vegetation. The genus is also absent in dry Andean valleys from western Venezuela to Ecuador. Considering this absence of the genus in Middle America and northern South America, the exist-

tence of a widespread, more or less continuous, tropical progenitor seems unlikely. Rather, the genus probably reached its present distribution through long-distance dispersal of achenes, perhaps by birds. Cruden (1966) has pointed out that, for many groups of taxa, transport of propagules by birds is the only likely mode of long-distance dispersal. Carlquist (1981) stated, "External attachment of seeds and fruits to birds has also played an appreciable role in the dispersal of flora to Hawaii." In particular, Gillet & Kim (1970) have shown that the large array of endemic *Bidens* species in the Hawaiian Islands has evolved from a single introduction from North America during the past five million years. Evidence also indicates that transport of seeds and fruits on or in birds can account for many of the North-South American desert disjunctions (Carlquist, 1983; Solbrig, 1972). Though it may seem unreasonable to evoke long-distance dispersal to explain present-day disjunctions (especially in taxa that today are not actively dispersed long distances), this hypothesis remains the best explanation for many of these unusual distributions. As Carlquist (1981) pointed out, it is unfortunate that one must "use evidence that is circumstantial, indirect, and subjective and therefore vulnerable."

That *Flourensia* is a long-time occupant of both continents may be deduced from ecological considerations. Species of the genus are often the sole dominants of the communities that they occupy. In fact, when dominant, they occupy different kinds of communities on the two continents. For example, in North America, *F. cernua* tends to dominate flats with deep soils (Muller, 1940), while *F. tortuosa* dominates dry grassy bajadas in northern Argentina. The dominant position of *Flourensia* in these totally different ecosystems must reflect long-time physiological selection for their respective roles.

Axelrod (1970) and Williams (1975) have argued that the present extensive regions of arid environment are of Pliocene-Pleistocene origin and were developing simultaneously in both hemispheres. Given the present amount of morphological divergence within the species of each continent, and their eco-geographical distribution, it appears that *Flourensia* was represented on both continents prior to Pleistocene time. The various taxa have almost certainly evolved independently on each continent in response to changing conditions since that time.

*Flourensia* possibly had its origin in North America. This conjecture is plausible simply be-

cause there is considerably greater morphological divergence among the North American taxa, and North America has been postulated as the origin for a great number of genera of Heliantheae, including all those thought to possess some affinities with *Flourensia* (Bentham, 1873; Turner, 1977).

Although there are more species of *Flourensia* in South America, this is a reflection of more recent events. It appears likely that many of the South American species have radiated into geographical and ecological areas postulated to have undergone a series of humid-arid cycles during the Quaternary which drastically and repeatedly altered vegetation patterns (Simpson, 1975). This area undoubtedly represents a region of secondary radiation.

## Taxonomic Treatment

*Flourensia* DC., Prodr. 5: 592. 1836. LECTO-TYPE (Blake, 1921): *Flourensia laurifolia* DC.

**Subshrubs, shrubs, or small trees;** trunks and stems with well-developed bark, brown to black; branchlets usually glandular, resinous, aromatic, glabrate to pilose-lanate. **Leaves** simple, alternate, linear-lanceolate to oval, pinnatinerved, midrib prominent on abaxial surface, finely prominulose-reticulate, mostly coriaceous, resinous, viscid, vernicose, the margins entire to dentate, often strigillose. **Capitulescences** solitary to cymose-paniculate; peduncles to 20 cm long, often bracteate. **Capitula** discoid or radiate, 6–20 mm high, 5–20 mm wide; involucre cylindrical, campanulate, hemispheric, or turbinate; phyllaries 2–5-seriate, imbricate, graduate, equal, or the outer overtopping the disc, linear-lanceolate to rhombic-ovate, herbaceous to indurate, glandular, resinous, glabrous to hirsute; paleae usually oblanceolate, embracing (and deciduous with) achenes, carinate, scarious to coriaceous, apically attenuate to truncate or cucullate, often mucronate, glandular, resinous, rarely hispidulous; receptacles flat to convex; ray florets 5–21 (or absent), neuter (rarely styliferous), sterile, the ligules yellow, oval to oblong, 7–50 mm long, apically bifid, the tube glabrous to sericeous; disc florets 10–150, the corollas yellow, cylindrical-campanulate to salverform, 4–8 mm long, the tube (0.5–) 1–1.5 (–2) mm long, 5-lobed, the lobes lance-triangular to deltoid, glandular, resinous, rarely spiculiferous; anthers ca. 4 mm long, the terminal appendages ovate, basally



obtuse; style branches slender, recurved, the appendages broadly acute to attenuate, dorsally hispidulous. **Achenes** laterally compressed to thickened, rarely terete, oblong to obconical or cuneate, 4–12 mm long, glabrous to villous-sericeous, glan-

dular, resinous, often finely striate; pappus of 2 (rarely 3 or 4) awns, rarely absent, persistent or disarticulating, ciliate, the bases ampliate, lac-  
erate; true squamellae absent. Base chromosome number:  $x = 18$ .

### Key to Species of *Flourensia*

1. Plants of North America (Mexico, southwestern United States) ..... 2
  2. Capitula discoid ..... 3
    3. Leaves entire ..... 4
      4. Leaves 1.5–13.5 cm long, 2–6 cm wide; petioles 5–10 mm long ..... 1. **F. laurifolia**
      4. Leaves 1–5 cm long, 0.5–1.5 cm wide; petioles 1–4 mm long ..... 5
        5. Achenes obscurely puberulent (appearing glabrous), pappus absent; phyllaries ca. 5-seriate ..... 6. **F. solitaria**
        5. Achenes villous-sericeous, pappus of 2, persistent, aristiform awns; phyllaries ca. 2-seriate ..... 6
        6. Capitulescences racemose-cymes; leaves narrowly elliptic to lanceolate ..... 2. **F. retinophylla**
        6. Capitulescences spiciform; leaves elliptic to ovate ..... 3. **F. cernua**
    3. Leaves dentate or iliciform ..... 7
      7. Leaves rhombic-ovate, the margins with 3–6, stiff, mucronate teeth; corolla lobes ca. 2.5 mm long ..... 5. **F. ilicifolia**
      7. Leaves elliptic-ovate, the marginal teeth lacking mucros; corolla lobes ca. 1 mm long ... 4. **F. dentata**
2. Capitula radiate ..... 8
  8. Mid-stem leaves not exceeding 2.5 cm long, 5–10 mm wide ..... 7. **F. microphylla**
  8. Mid-stem leaves 3.5–14 cm long, 2–7 cm wide ..... 9
  9. Suffruticose, stems unbranched, to 0.5 m tall; ray florets 13–21 ..... 13. **F. pringlei**
  9. Shrub, stems much-branched, usually over 1 m tall; ray florets 7–13 (–16) ..... 10
    10. Capitulescences cymose-paniculate, 5–20-headed; ray florets 7–10 ... 9. **F. glutinosa**
    10. Capitulescences cymose to solitary, 1–5-headed; ray florets 10–13 (–16) ..... 11
      11. Phyllaries 2-seriate, 18–20 mm long, the outer overtopping the disc ..... 12. **F. pulcherrima**
      11. Phyllaries 3–4-seriate, 4–10 mm long, imbricate to subequal ..... 12
        12. Cauline leaves 3.5–7 cm long, 8–18 mm wide; petioles 2–4 mm long; ray florets ca. 10 ..... 10. **F. resinosa**
        12. Cauline leaves 6–14 cm long, 2–6.5 cm wide; petioles 7–22 mm long; ray florets ca. 13 ..... 13
          13. Leaves ovate, basally oblique, rounded; capitulescences cymose-paniculate, 4–5-headed ..... 8. **F. collodes**
          13. Leaves lanceolate to obovate, basally attenuate; capitulescences solitary ..... 11. **F. monticola**
  1. Plants of South America (Peru, Chile, Bolivia, Argentina) ..... 14
    14. Leaf margins deeply to shallowly repand-dentate to cuspidate-denticulate ..... 15
      15. Capitula 1–2 cm high, 14–25 mm wide; ray florets 12–16 ..... 16
        16. Leaves ovate to oblong-elliptic, the margins repand-dentate with 4–10 pairs of triangular teeth; capitulescences cymose, 4–8-headed; peduncles 3–13 cm long ... 14. **F. thurifera**
        16. Leaves elliptic-lanceolate to elliptic, the margins with 2–3 pairs of teeth distally; capitulescences solitary or weakly cymose, 2–3-headed; peduncles 4–6 cm long ..... 23. **F. oolepis**
      15. Capitula 8–12 mm high, 5–15 mm wide; ray florets 5–8 ..... 17

17. Leaves oval to oblong or lanceolate, the margins shallowly denticulate-cuspidate; petioles 2–5 mm long; capitula 10–12 mm high, 8–15 mm wide ..... 18
18. Leaves oval to oblong-oval, apice obtuse to subobtusate ..... 15. *F. macrophylla*
18. Leaves lanceolate to narrowly-elliptic, apices acute ..... 16. *F. angustifolia*
17. Leaves lanceolate to rhombic-ovate or ovate, the margins deeply and irregularly repandentate or with slight denticulations; petioles (2–) 5–13 mm long; capitula ca. 8 mm high, 5–7 mm wide ..... 19
19. Capitulescences weakly cymose, 2–4-headed ..... 30. *F. leptopoda*
19. Capitulescences cymose-paniculate, 5–15-headed ..... 29. *F. campestris*
14. Leaf margins strictly entire ..... 20
20. Subshrubs to 20 cm tall; largest leaves narrowly linear-lanceolate to linear-ob lanceolate, 2–4 mm wide (some individuals of *F. fiebrigii* and *F. suffrutescens* have reduced habits, but leaves 7–18 mm wide) ..... 31. *F. hirtissima*
20. Shrubs greater than 20 cm tall; leaves elliptic to lanceolate or ovate, the largest leaves 5–60 cm wide ..... 21
21. Phyllaries greater than 2 mm wide (at least the inner); ray florets (9–) 10–21 ..... 22
22. Capitulescences weakly cymose to cymose-paniculate (rarely solitary); outer phyllaries 7–9 mm long, 1–2 mm wide, linear-lanceolate to lanceolate ..... 23
23. Capitulescences cymose-paniculate, 4–8-headed; peduncles mostly 3–5 cm long ..... 18. *F. polycephala*
23. Capitulescences weakly cymose, 2–5-headed (occasionally solitary); peduncles mostly 5–8 cm long ..... 19. *F. heterolepis*
22. Capitulescences solitary (rarely weakly cymose); outer phyllaries (5–) 10–22 mm long, 2–7 mm wide, lanceolate-elliptic to ovate ..... 24
24. Leaves narrowly lanceolate to oblong, 8–18 mm wide .. 20. *F. suffrutescens*
24. Leaves lanceolate to elliptic or oval, 15–60 mm wide ..... 25
25. Phyllaries sericeous; ray florets 13–21, the ligules 25–50 mm long. .... 21. *F. macroligulata*
25. Phyllaries puberulent to glabrous; ray florets ca. 10, the ligules 18–30 mm long ..... 22. *F. tortuosa*
21. Phyllaries to 2 mm wide; ray florets 5–8 (–10) ..... 26
26. Leaves ovate-lanceolate to ovate, (11–) 15–50 mm wide ..... 27
27. Leaves 6–14 cm long, 15–50 mm wide ..... 28. *F. riparia*
27. Leaves 3.5–9 cm long, 11–34 mm wide ..... 28
28. Capitulescences cymose, 2–4-headed ..... 27. *F. niederleinii*
28. Capitulescences cymose-paniculate, 5–15-headed ..... 29. *F. campestris*
26. Leaves narrowly oblong-elliptic to lanceolate or oblanceolate, (3–) 4–14 (–20) mm wide ..... 29
29. Leaves mostly less than 3.5 cm long, narrowly oblong-elliptic; outer phyllaries glabrous ..... 25. *F. blakeana*
29. Leaves mostly greater than 3.5 cm long, linear-lanceolate to oblanceolate; outer phyllaries strigillose to hirsutulose, rarely glabrescent ..... 30
30. Leaves lanceolate to linear-lanceolate, 5–10 (–12) mm wide; phyllaries 6–10 mm long, the margins strigillose to hirsutulose; ray florets 5–8 ..... 26. *F. hirta*
30. Leaves lanceolate to oblanceolate, (5–) 7–14 (–20) mm wide; phyllaries 4–6 (–8) mm long; ray florets 7–10 ..... 24. *F. fiebrigii*

1. *Flourensia laurifolia* DC., Prodr. 5: 592. 1836. TYPE: Mexico, Tamaulipas, between Victoria ("Vittoria") and Tula, "cerca Las Minces," Nov. 1830, *J. L. Berlandier 2205* (lectotype, chosen from two isotypes, G-DC, IDC Microfiche 800. 952: I. 3!; isolectotypes, G-DC, IDC Microfiche

800. 952: I. 4!, BM!, F!, GH!, MO!, NY!). Figures 3, 9.

*Helianthus laurifolius* (DC.) Benth. & J. D. Hook. ex J. D. Hook. & A. B. Jackson, Ind. Kew. 1: 1112. 1893.

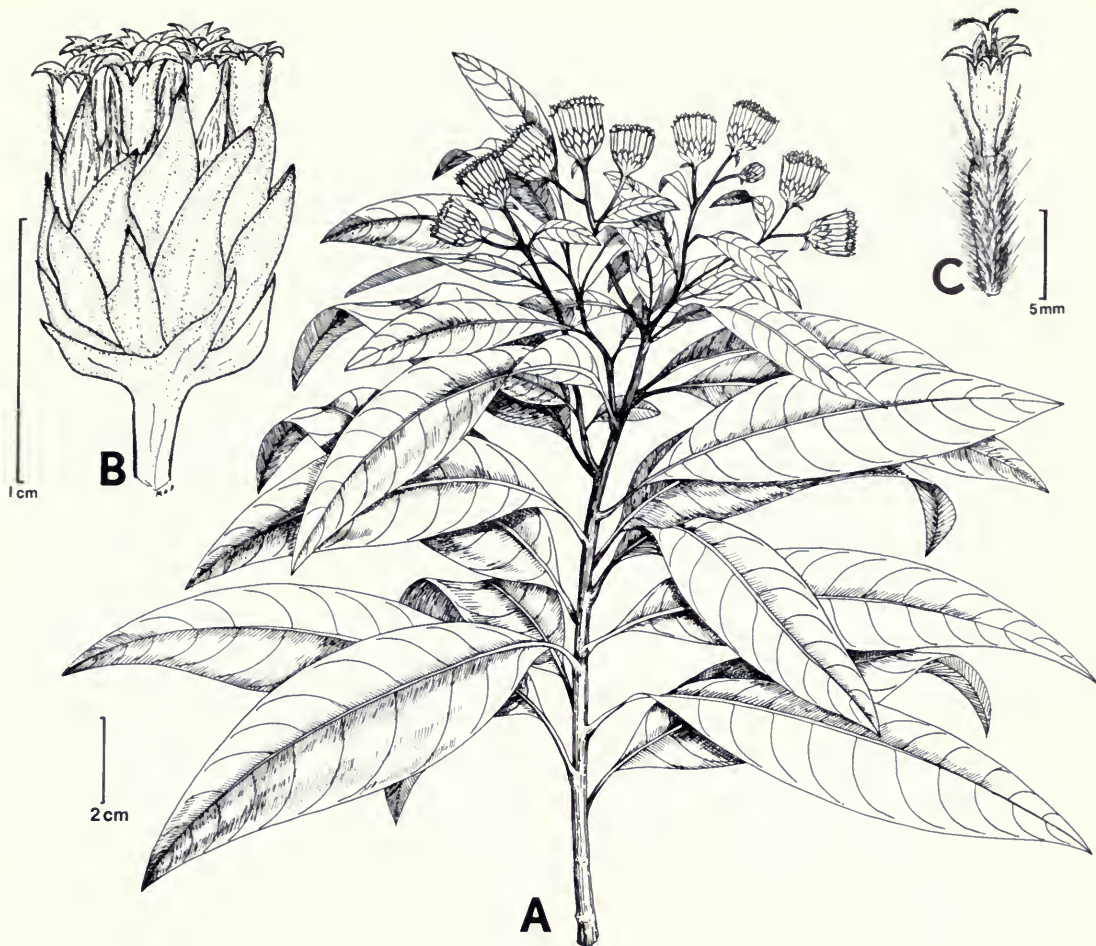


FIG. 3. *Flourensia laurifolia* (from Dillon & Reynolds 659, F). A, habit; B, capitulum; C, floret.

Arborescent shrubs or small trees to 5 m tall; branches gray-brown; branchlets resin-encrusted. Leaves ovate to elliptic-ovate, 5.5–13.5 cm long, 2–6 cm wide, the costae strigillose, otherwise glabrous, upper surface vernicose, basally cuneate, apically acuminate to attenuate (rarely obtuse), the margins entire; petioles 5–15 mm long, strigillose. Capitulescences cymose-paniculate, 3–7-headed; peduncles 1–4 cm long, bracteate. Capitula discoid, 11–18 mm high, 10–15 mm wide; involucre cylindrical to hemispheric; phyllaries 3–4-seriate, imbricate, subherbaceous, ciliolate, the outer linear-lanceolate to lance-ovate, 5–6 mm long, 1–3 mm wide, the inner oblong-ovate to oblong-lanceolate, 8–10 mm long, 2–3 mm wide, all apically acute, indurate and reflexed in fruit; paleae oblan- ceolate, ca. 12 mm long, apically obtuse; florets 30–50, the corollas cylindric-campanulate, 6–7 mm

long, the tube ca. 2 mm long, the lobes ca. 1.5 mm long. Achenes obconical, 6.5–8 mm long, thick- ened, sericeous; pappus of 2 awns, ca. 5 mm long. Chromosome number:  $n = 18$ .

FLOWERING (AND FRUITING) PERIOD—Septem- ber–December (December–April).

DISTRIBUTION AND HABITAT (FIG. 9)—Domi- nant locally on dry, steep, limestone slopes of in- termontane valleys in the Sierra Madre Oriental, from southwestern Tamaulipas, western San Luis Potosí, and northern Hidalgo, Mexico (900–1,600 m).

VERNACULAR NAME—*Ojancha*.

REPRESENTATIVE SPECIMENS EXAMINED—MEXICO. Hidalgo: Jacala, Kenoyer 839 (ARIZ, F, MO); dry slopes be- yond Hilo Juanico on road to Pacula, Moore 1802 (GH).

**San Luis Potosí:** ca. 37 km E of Rioverde, *Cronquist 11276* (F, GH, NY, US); ca. 15 km NW of Cárdenas, along road to Ciudad del Maiz, *Cronquist & Villaseñor 11743* (F, NY); W of Minas de San Rafael, *Moran 10012* (ARIZ, SD, UC, US); San Luis Potosí to Tampico, *Palmer 1109* (GH); Minas de San Rafael, *Purpus 4789* (BM, F, GH, MO, NY, SD, US); Pozo de Acuña, Guadalcázar, *Rzedowski 686* (ENCB, GH, TEX, US); ca. 5 km W of Santa Catarina, San Nicolár Tolentino, *Rzedowski 5729* (ENCB). **Tamaulipas:** ca. 20 mi SW of Victoria, *Bacon & Dillon 1713* (F); 13 mi S of Victoria, *Carlson 2750* (F[2], GH, TEX); Mesa de Llera, *Davis s.n.* (TEX); 11 mi N of Tropic of Cancer, 20 mi S of Victoria, *Dillon & Reynolds 659* (F, MEXU, MO, NY, TEX); ca. 40 mi NE of Tula, *Dillon et al. 639* (F, MEXU, MO, TEX); 16 mi S of Victoria, *Graham & Johnston 4717\** (TEX); near Llera, *Kenoyer & Crum 3435* (A); ca. 20 mi S of Victoria, *Lowrey et al. s.n.* (TEX); 13 mi WSW of Jaumave, *Moran 10025* (SD); vicinity of Victoria, *Palmer 32* (F, GH, MO, NY, US); Tula, *Puig 3678* (ENCB); between Jaumave and Victoria, *Rozynski 178* (F, NY, UC); La Jolla Ranch, *Runyon 1013* (US); valley of Jaumave, *Runyon 5453* (TEX); 20 mi S of Ciudad Victoria, *Smith & Barkley 17M165* (F, GH, MSC); Jaumave, *Viereck 851* (US); 34 mi S of Victoria, *Webster & Breckon 16374* (GH). **CULTIVATED UNITED STATES.** Texas: Houston, nursery, raised from seeds collected at Tamazunchale, San Luis Potosí, Mexico, *Lowry s.n.* (US); Brownsville, grown from seed collected S of Victoria, Tamaulipas, Mexico, *Runyon 2004* (F[2], TEX), *Runyon 3544* (BM, TEX).

*Flourensia laurifolia* is readily distinguished by its arborescent habit and large, discoid capitula in cymose panicles. It has shiny, evergreen leaves and fragrant flowers, and has been taken into cultivation as an ornamental in northeastern Mexico and southern Texas.

In the Tamaulipan Thorn Scrub, this species is locally dominant, with populations commonly having many seedlings evident in the understory. Its associates include *Acacia*, *Agave*, *Celtis*, *Cordia*, and *Opuntia*.

**2. *Flourensia retinophylla*** S. F. Blake, Proc. Amer. Acad. Arts 49: 505. 1913. TYPE: Mexico, Coahuila, Sierra de la Paila, Nov. 1910, *J. A. Purpus 4728* (holotype, GH!, isotypes, BM!, F!, MO!, NY!, UC!, US!). Figures 4, 9.

**Shrubs** to 3 m tall; stems much-branched, resinous, aromatic, the bark brown to black. Leaves narrowly elliptic to lanceolate, 1.5–6 cm long, 4–12 mm wide, upper and lower surfaces glabrous, acute to attenuate at both ends, the margins entire, strigillose; petioles 1–3 mm long. **Capitulescences** racemose-cymose, 2–6-headed; peduncles 5–20 mm, bracteate. **Capitula** discoid, 10–13 mm high, 5–10 mm wide; involucre cylindrical to campan-

ulate; phyllaries 2-seriate, subequal, subherbaceous, the outer lanceolate to lance-oblong, apically acute, the inner ovate-lanceolate, apically acute to obtuse, 4–6 mm long, 1–2 mm wide; paleae oblanceolate, ca. 10 mm long, apically acute to obtuse; florets 10–25, the corolla cylindrical-campanulate, ca. 6 mm long, the tube ca. 1.5 mm long, the lobes ca. 1 mm long. **Achenes** obconical to cuneate, ca. 6 mm long, sericeous; pappus of 2 (–3) awns, ca. 3 mm long, basally ampliate.

**FLOWERING (AND FRUITING) PERIOD**—August–November (November–March).

**DISTRIBUTION AND HABITAT** (FIG. 9)—Found on steep, limestone slopes in the mountains surrounding the Cuatro Ciénegas Basin and Laguna del Rey in central Coahuila, Mexico (1,200–2,100 m).

**VERNACULAR NAME**—*Yerba de la mula*.

**REPRESENTATIVE SPECIMENS EXAMINED**—MEXICO. **Coahuila:** N foot of Sierra de la Madera, ca. 5 km SE of Rancho Cerro, *Chiang et al. 9370* (TEX); Sierra de Paila, ca. 10 mi N of Sta. Marte, *Dillon & Hartman 658* (BM, F, GH, HUT, MEXU, MO, NY, TEX); ca. 23 mi NW of Las Delicias, Sierra de Las Delicias, *Henrickson 6143* (TEX); ca. 62 mi WSW of Cuatro Ciénegas, Sierra de Organos, *Henrickson 12141* (TEX); ca. 35 km NW of Cuatro Ciénegas, Sierra de la Madera, *Henrickson & Wendt 11848* (TEX); Puerto Colorado, Sierra de la Fragua, *Johnston 8698* (GH, TEX); ca. 6 km S of Ejido La Noria, Sierra de San Marcos, *Johnston et al. 10311* (TEX); Mina La Abundancia, Sierra de la Paila, *Johnston et al. 10509A* (TEX); Sierra San Marcos, *Johnston et al. 10923* (TEX); Mina El Aguirreño, N side of Sierra de la Paila, *Johnston et al. 11702* (TEX); 8 km W of Cuatro Ciénegas, Sierra de la Madera, *Johnston et al. 12079C* (TEX); 9.5 km E of Puerto del Gallo, Sierra de los Organos, *Johnston et al. 12136D* (TEX); Sierra de San Marcos, opposite Los Fresnos, *Keil et al. 6082* (ASU); Cañón de San Salvador, Sierra Mojada, *Muller 3314* (F, GH, MICH, MO, TEX, UC); 6 km SE of Esmeralda, Sierra Mojada, *Stewart 2218* (BM, F, GH, TEX); Cañón de la Barrica, *Wendt & Lott 1382* (TEX); Valle de Buenavista, Sierra Organos, *Wendt & Lott 1416* (TEX); above El Pajarito, Sierra de la Fragua, *Wendt & Lott 1427* (TEX); upper reaches of Cañón Corazón del Toro at Mina La Abundancia, *Wendt et al. 10110A* (TEX).

*Flourensia retinophylla* is distinguished from the other discoid taxa by its narrowly elliptic to lanceolate leaves and many-headed capitulescences. It occupies a wide altitudinal range, from just above the desert floor up to the highest portions of many canyons. Its associates include *Acacia berlandieri*, *Agave lecheguilla*, *Arctostaphylos*, *Dasyllirion*, *Hechtia*, *Pinus pinceana*, *Quercus intricata*, *Rhus virens*, and *Viguiera stenoloba*.

The present distribution of this species suggests



FIG. 4. *Flourensia retinophylla* (from Dillon & Hartman 658, f). A, habit; B, capitulum; C, floret.

that it may have been widespread at lower elevations within the Cuatro Ciénegas basin during pluvial periods and became fragmented as more arid conditions developed at lower elevations.

3. *Flourensia cernua* DC., Prodr. 5: 593. 1836.  
 TYPE: Mexico, Nuevo León, "ad Monterrey,"  
 Jan. 1828, *J. L. Berlandier 1401* (lectotype, here

designated, G-DC, IDC Microfiche 800. 952: I. 5!; isotypes BM!, F!, GH!, MO!). Figures 5, 13.

*Helianthus cernuus* (DC.) Benth. & J. D. Hook. ex J. D. Hook & A. B. Jackson, Ind. Kew. 1: 1112. 1893.

**Shrubs** to 2 m tall; stems much-branched; branchlets, resinous, aromatic, brown to black,

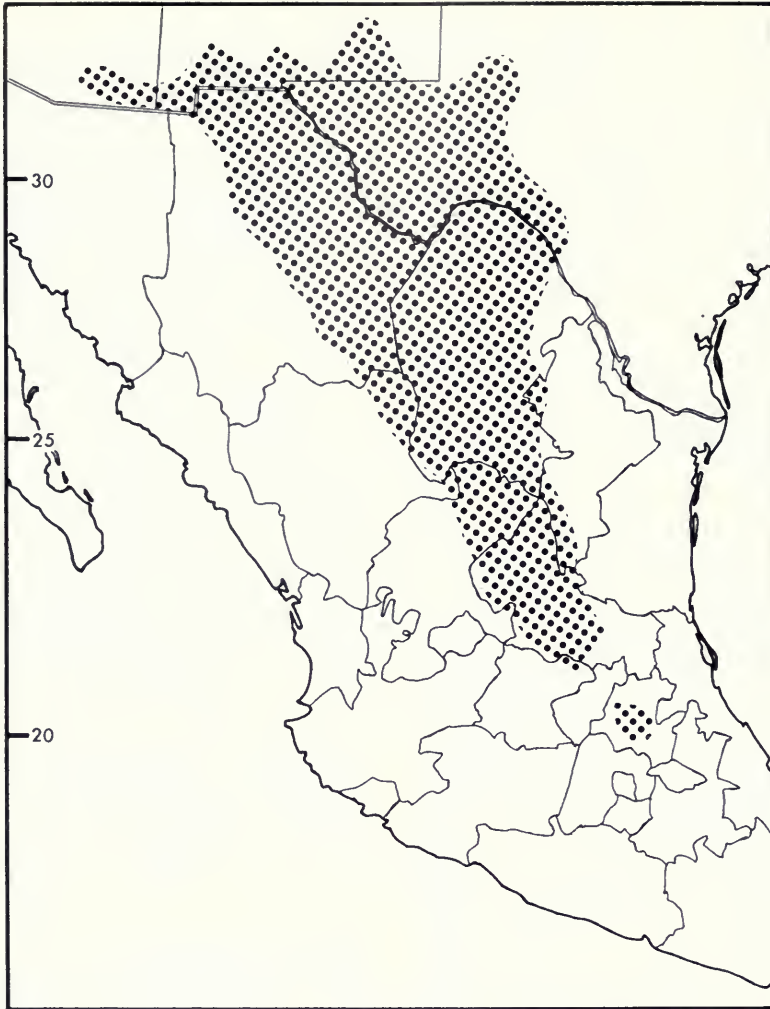


FIG. 5. Distribution of *Flourensia cernua*.

strigillose. **Leaves** elliptic to ovate, (10–) 17–25 (–40) mm long, 5–12 (–20) mm wide, upper and lower surfaces strigillose, basally cuneate, apically acute, the margins entire, strigillose, often undulate; petioles 1–5 mm long, strigillose. **Capitulescences** solitary, terminal and axillary, spiciform; peduncles to 10 mm long, bracteate. **Capitula** discoid, 5–10 mm high, 5–10 mm wide, nodding in fruit; involucre cylindrical; phyllaries ca. 3-seriate, imbricate, subherbaceous, ciliolate, lanceolate to ovate-lanceolate, 3–5 mm long, 1–2 mm wide; paleae lanceolate, 5–9 mm long, apically acute to attenuate; florets 10–25 (–40), the corollas cylindrical, 3–4 mm long, the tube ca. 1 mm long, the

lobes ca. 0.3 mm long. **Achenes** obconical to cuneate, 4–6.5 mm long, villous; pappus of 2 awns, 2.5–3.5 mm long. Chromosome number:  $n = 18$ .

**FLOWERING (AND FRUITING) PERIOD**—September–November (December–March).

**DISTRIBUTION AND HABITAT (FIG. 5)**—Frequent on caliche and sandy soil throughout the Chihuahuan Desert region of north-central Mexico, including the states of Chihuahua, Coahuila, Durango, Guanajuato, Hidalgo, Nuevo León, San Luis Potosí, and Zacatecas, and the southwestern United States, including Arizona, New Mexico, and Texas (800–2,000 m).

VERNACULAR NAMES—Blackbrush, tarbush, varnish bush; *hojase*, *hojasen*, *ojasen*.

REPRESENTATIVE SPECIMENS EXAMINED—MEXICO. **Chihuahua:** 45 mi SE of Delicias, *Dillon & Hartman 645* (TEX); hills and plains near Chihuahua, *Pringle 292* (A, BM, F, GOET, MICH, US). **Coahuila:** 1.5 km W of Tres Lomas, *Chiang et al. 10057\** (TEX); 3 mi S of Agua Nueva, 20 mi S of Saltillo, *Dillon & Hartman 654\** (F, TEX); Sierra de Paila, on road to Mina La Abundancia, *Dillon & Hartman 657\** (F, HUT, MEXU, MO, NY, TEX, US); near Saltillo, *Palmer 286* (A, F, GH, MO, MSC, US); at Parras and vicinity, *Palmer 434* (BM, F, GH, MO, UC, US). **Durango:** 2 mi S of Pedriceña, 54 mi S of Gómez Palacio, *Dillon & Hartman 649* (F, TEX); 27 km SW of Ceballos, *Wendt et al. 9979\** (TEX). **Guanajuato:** ca. 2 km E of Fábrica de Melchor, SW of Municipio de San Felipe, *Rzedowski 9541* (ENCB). **Hidalgo:** ca. 10 mi SE of Ixmiquilpan, 20 mi NW of Actopan, *Dillon & Reynolds 675* (TEX). **Nuevo León:** ca. 3 mi S of San Roberto Junction, ca. 75 mi N of Matehuala, *Cronquist 9833* (GH, MO, MSC, TEX, US). **San Luis Potosí:** region of San Luis Potosí, *Parry & Palmer 469* (BM, F, MO, US). **Zacatecas:** 38.5 mi N of Zacatecas, 12.5 km N of Bañón, *Dillon & Hartman 651\** (F, MEXU, TEX). **UNITED STATES. Arizona:** Cochise Co.: Portal to Paradise, Chiricahua National Forest, *Eggleston 10667* (US). **New Mexico:** Dona Ana Co.: 27.7 mi E of Las Cruces, *Dunn 5335* (US); Eddy Co.: road to Carlsbad Cavern, *Standley 40376* (US); Grant Co.: Hachita, *Goldman 1306* (US); Luna Co.: 12 mi E of Deming, *Dillon & Baker 723* (F, TEX); Otero Co.: Tularosa, *Gaut 20* (US); Sierra Co.: Las Palomas, *Goldman 1792* (US). **Texas:** Brewster Co.: 9 mi S of Marathon, *Dillon & Baker 714\** (F, TEX); Crane Co.: ca. 16 mi W of Crane, *Warnock 14638* (LL); Crockett Co.: 31.3 mi W of Ozona, *Dillon 419* (TEX); Culberson Co.: 9 mi W of Kent, *Dillon & Baker 719\** (F, TEX); El Paso Co.: N end of Franklin Mts., *Correll 26528* (LL, UC); Howard Co.: Big Springs, *Bray 401* (TEX, US); Hudspeth Co.: 20 mi W of Van Horn, *Dillon & Baker 721\** (F, TEX); Jeff Davis Co.: 34 mi N of McDonald Observatory, *Dillon & Baker 717* (F, TEX); Mitchell Co.: 26 mi S of Colorado City, *Cory 49345* (GH); Pecos Co.: 1 mi S of Ft. Stockton, *Dillon & Baker 711\** (F, TEX); Presidio Co.: 23 mi S of Marfa, *Muller 5081* (GH, LL); Reagan Co.: between Upton Co. line and Texon, *Correll & Correll 27118* (TEX). Val Verde Co.: Comstock, *Palmer 11062* (A, US).

*Flourensia cernua* is easily distinguished by its small, entire, ovate to oval leaves and small, nearly sessile discoid capitula. The pungent odor of its foliage is also quite characteristic. There is considerable variation in leaf size within its range; the smallest leaves are found in southeastern populations, the largest in the northwest (Arizona and New Mexico).

This is the only widespread species within the genus in North America. It is a co-dominant with *Larrea tridentata* over much of its distribution in north-central Mexico and the southwestern United States. This type of vegetation was referred to by

Muller (1940) as the *Larrea-Flourensia* climax association. Gardner (1951) suggested that *L. tridentata* outlives *F. cernua* in such mixed communities, and *Larrea* eventually becomes the postclimax dominant.

*Flourensia cernua* has long been used medicinally by native peoples and is still sold in markets of central Mexico. It was listed by Martinez (1969) as an indigestion remedy. A tincture is prepared from several grams of leaves placed in 90% ethanol and consumed along or mixed with another beverage. Maxwell (1968) stated that it was used by curanderos of northern Mexico as a treatment of yellow jaundice.

*Flourensia cernua* is poisonous to sheep and goats in western Texas and, probably, throughout its range. Controlled feeding experiments (Mathews, 1944) using ripe achenes reportedly produced acute inflammation of the abomasum and duodenum of sheep, goats, and rabbits, with death within 18 to 72 hours. Green leaves were not found to be toxic. Most poisoning is likely to occur in late fall and winter (December–March) when the fruiting heads are formed and more desirable forage plants become depleted. Although the toxic agent has not been identified, *F. cernua* is known to possess several potentially toxic flavonoids and sesquiterpenes (Dillon et al., 1976; Dillon & Mabry, 1977; Kingston et al., 1971, 1975). Cattle losses from *F. cernua* have not been reported; either cattle do not feed heavily on this species or are tolerant to it.

*Flourensia cernua* forms putative hybrids with *F. resinosa* (see discussion under the latter species).

4. *Flourensia dentata* S. F. Blake, J. Wash. Acad. Sci. 25: 315. 1935. TYPE: Mexico, Durango, Terreros near Pedriceño, “campos guayuleros, ad viam,” 11 Nov. 1925, *S. Juzepczuk 609* (holotype, US; isotype, LE; isotype fragment, TEX!). Figures 6, 9.

Rounded shrubs to 1 m tall; stems much-branched, the bark black to brown; branchlets reddish brown, resinous, minutely strigillose. Leaves oblanceolate to elliptic, 10–25 (–37) mm long, 5–15 mm wide, upper and lower surfaces minutely strigillose, basally cuneate, apically acute, the margins dentate or dentate-serrate, 1–5 pairs of unequal teeth, 0.5–5 mm long, acute, axillary leaves occasionally entire; petioles 1–4 mm long, strigillose. Capitulescences solitary, or weakly cymose,

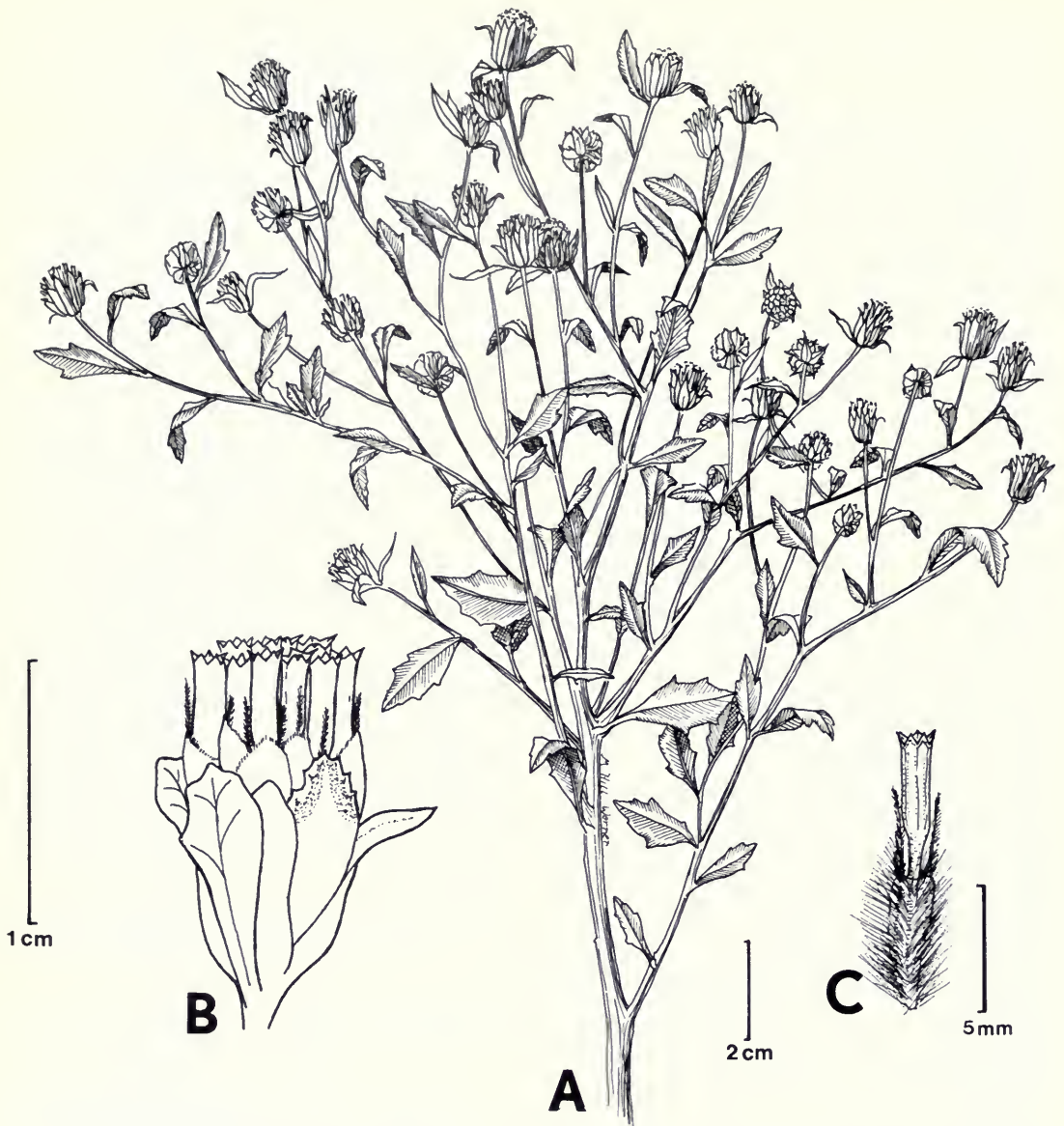


FIG. 6. *Flourensia dentata* (from Dillon & Hartman 652, F). A, habit; B, capitulum; C, floret.

1-3-headed; peduncles 1-4 cm long, bracteate. **Capitula** discoid, 9-11 mm high, ca. 8 mm wide; involucre cylindrical, substended at base by 1-3 spatulate or oblanceolate leaves; phyllaries 2-3-seriate, subequal, subherbaceous, the outer linear-oblong to linear-lanceolate, 6-10 mm long, 1.5-2.5 mm wide, apically acute, ciliolate, the inner oblong to oblanceolate, 7-9 mm long, 2-4 mm wide, apically obtuse to rounded, erose-lacerate; paleae oblanceolate, ca. 8.5 mm long, apically

rounded, erose-lacerate, the margins scarios; florets 15-25, the corollas cylindrical, ca. 5 mm long, the tube ca. 1 mm long, the lobes 0.5-0.8 mm long. **Achenes** cuneate, ca. 6 mm long, sericeous; pappus of 2 awns, 3-4 mm long, deciduous or rarely absent.

**FLOWERING (AND FRUITING) PERIOD**—September–November (November–January).

**DISTRIBUTION AND HABITAT** (FIG. 9)—Scattered populations occur on limestone soils from central



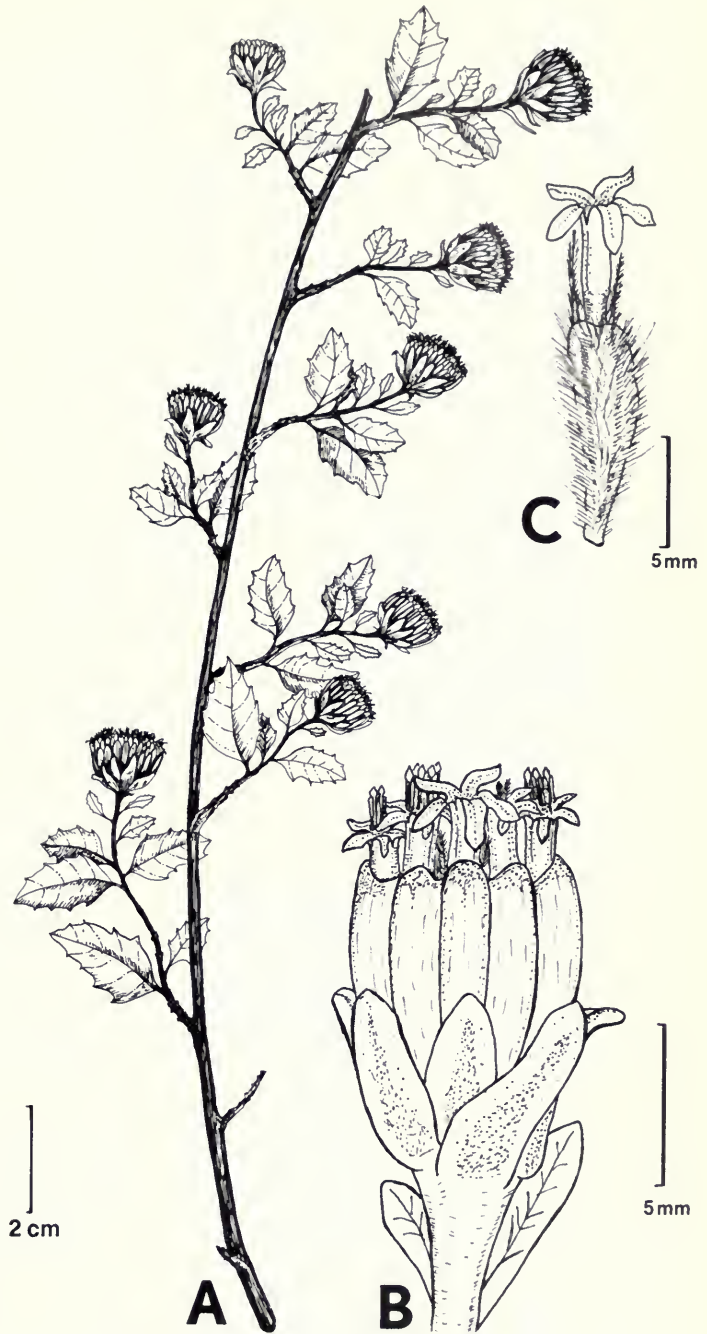


FIG. 7. *Flourensia ilicifolia* (from Purpus 1105, F). A, habit; B, capitulum; C, floret.

Zacatecas, north to the Río Nazas basin in eastern Durango (1,500–2,100 m).

**SPECIMENS EXAMINED**—**MEXICO. Durango:** Menores and vicinity in Río Nazas Basin, *Gentry 8611* (GH, MICH, UC); Sombreretillo, *Juzepczuk 550* (US); near La Purísima, *Shreve 9180* (ARIZ, GH, MICH, UC). **Zacatecas:** 38.5

mi N of Zacatecas, 12.5 mi N of Bañón, *Dillon & Hartman 652* (F, GH, HUT, MEXU, MO, NY, TEX, US); 17 mi NE of Zacatecas, *Hartman et al. 3848* (TEX); 11 mi N of Sierra Hermosa, *Johnston 7400* (GH, US); 14 mi S of Sta. María de Bañón, *Johnston 7441* (GH, US); 11 mi N of Sierra Hermosa, *Shreve 8587* (ARIZ, US); 58.6 km N of Fresnillo, *Wendt et al. 2185* (F).

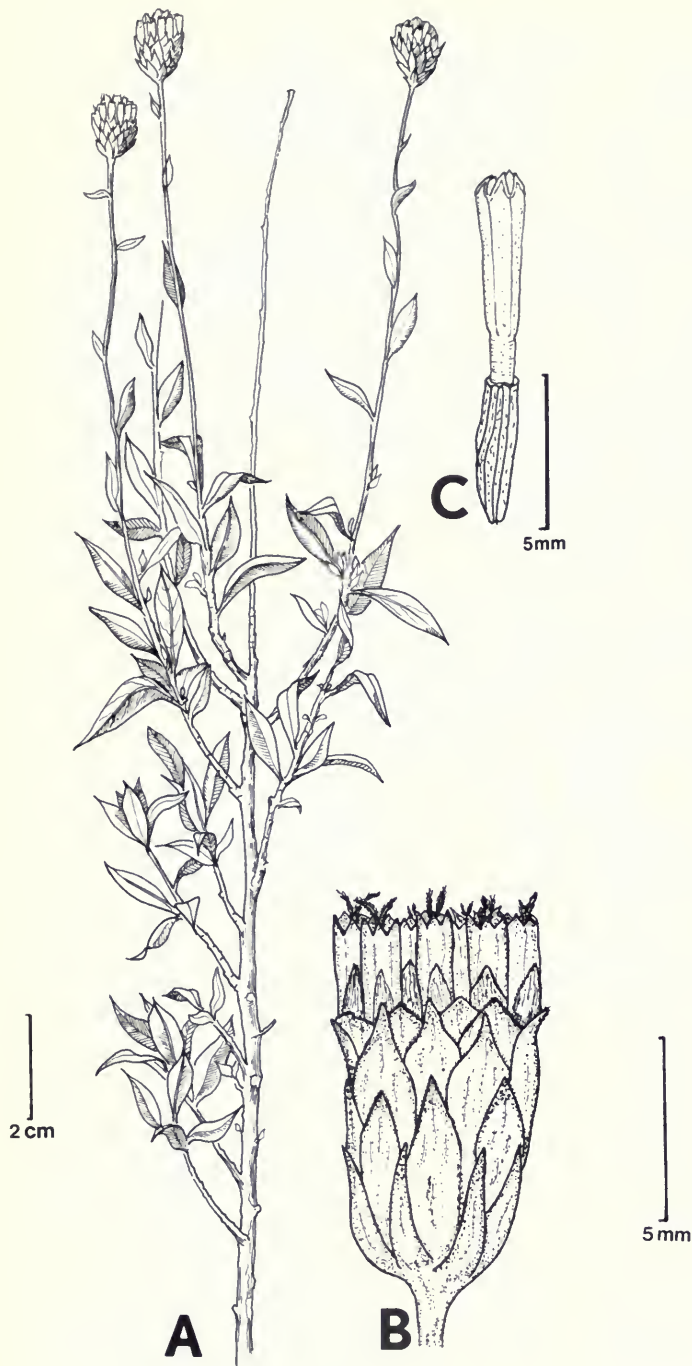


FIG. 8. *Flourensia solitaria* (from Henrickson & Dillon 15602, ♀). A, habit; B, capitulum; C, floret.

*Flourensia dentata* and *F. ilicifolia* are the only *Flourensias* with discoid heads and toothed leaves. *Flourensia dentata* is readily distinguished by its smaller and narrower dentate leaves and corolla lobes less than 1 mm long.

In central Zacatecas, *Flourensia dentata* and *F. cernua* occur sympatrically in the *Opuntia* scrub and intermittent grasslands. Individuals often occur within a few meters of each other. Efforts to detect hybrids have been unsuccessful.

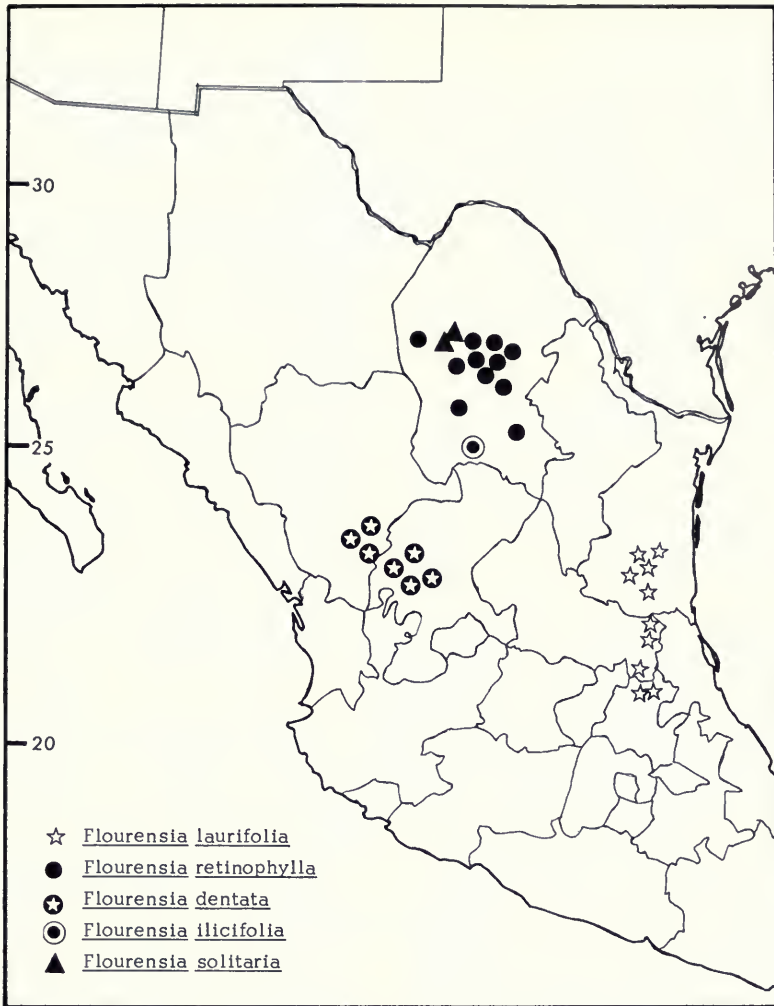


FIG. 9. Distribution of *Flourensia dentata*, *F. ilicifolia*, *F. laurifolia*, *F. retinophylla*, and *F. solitaria*.

5. *Flourensia ilicifolia* Brandegee, *Zoe* 5: 238. 1906. TYPE: Mexico, Coahuila, Sierra de Parras, Mar. 1905, *J. A. Purpus 1150* (holotype, UC!; isotypes, BM!, F!, GH!, MO!, NY!). Figures 7, 9.

**Shrubs** to 1.5 m tall; stems much-branched; branchlets grayish brown, resin-encrusted, puberulent. **Leaves** rhombic-ovate, 1–2.5 (–5.5) cm long, 0.6–1.5 (–2.5) cm wide, puberulent to glabrescent, basally cuneate, apically acute, the margins dentate with 3–6 pairs of stiff, mucronate teeth (rarely entire); petioles 2–4 (–6) mm long, puberulent. **Capitulescences** solitary or in 2–3-headed terminal

clusters; peduncles to 1 cm long, puberulent, 1–3-bracteate, the bracts linear-spathulate, 5–7 mm long. **Capitula** discoid, 10–15 mm high, 10–13 mm wide; involucre campanulate to cylindrical; phyllaries 2-seriate, subequal, coriaceous, oblong to oblong-ovate, 5–7 mm long, 1.0–2.5 mm wide, apically obtuse, ciliolate; paleae oblanceolate, 7–9 mm long, apically cucullate, obtuse to rounded, lacerate, scarious; florets 20–30, the corollas cylindrical-campanulate, ca. 6.5 mm long, the tube ca. 1 mm long, the lobes ca. 2.5 mm long. **Achenes** cuneate, 7–9 mm long, sericeous; pappus of 2 awns, 2.5–4.5 mm long, persistent, broadly lanceolate, basally ampliate, united by a low crown of fused hairs, 2–3 mm long.

FLOWERING (AND FRUITING) PERIOD—September–October (October–November).

DISTRIBUTION AND HABITAT (FIG. 9.)—Endemic to the Sierra de Parras, in south-central Coahuila, Mexico. The population occurs predominantly in dry canyons on calcareous gravel, but occasional individuals occur on lower bajadas in close proximity to *Flourensia cernua* (1,600–1,800 m).

SPECIMENS EXAMINED—MEXICO. Coahuila: 1 km W of Parras, *Dillon et al.* 629 (F, MEXU, TEX); Sierra de Parras, *Johnston et al.* 10996 (TEX); Sierra de Parras, *Shreve & Tinkham* 9878 (GH).

*Flourensia ilicifolia* is distinguished by its rhombic-ovate, dentate leaves with mucronate-tipped teeth and its loose involucre with large, obtuse phyllaries. It also possesses characteristically long corolla lobes, ca. 2.5 mm long versus ca. 1 mm long for most congeners.

6. *Flourensia solitaria* S. F. Blake, J. Wash. Acad. Sci. 40: 49. 1950. TYPE: Mexico, Coahuila, rocky flats and slopes, top of grade at Cuesta de Zozaya, road from Ocampo W over mountains to Puertecito via Cuesta de Zozaya, 20 Sept. 1941, *I. M. Johnston* 9289 (holotype, GH!; isotypes, TEX!, US!). Figures 8, 9.

**Shrubs** to 60 cm tall; stems much-branched, the back gray to brown, fissured, aromatic, strigillose. **Leaves** oblanceolate to obovate, 1.2–3.3 cm long, 0.3–1 cm wide, upper and lower surfaces minutely strigillose, basally cuneate, sessile to subsessile, apically acute, the margins entire, undulate, strigillose. **Capitulescences** solitary, terminal; peduncles 13–20 cm long, strigillose, reddish brown, multi-bracteate. **Capitula** discoid, ca. 12 mm high, 8–13 mm wide; involucre campunulate; phyllaries 5-seriate, imbricate, the outer lanceolate, 3.5–5 mm long, 1–1.5 mm wide, the inner oblong-obovate to rhombic, 4.5–6 mm long, 1.5–2.5 mm wide, all basally indurate, stramineous, apically herbaceous, acute, strigillose; paleae rhombic-obovate to narrowly cuneate-spatulate, 10–12 mm long, 1–3 mm wide, apically acute, scarious, strigillose. **Achenes** cylindrical to oblong-lanceolate, 4.8–5.5 mm long, ca. 2.2 mm wide, 5–6-ribbed, obscurely puberulent; epappose. Chromosome number:  $n = 18$ .

FLOWERING (AND FRUITING) PERIOD—September–November (December–January).

DISTRIBUTION AND HABITAT (FIG. 9)—This rare

species is known only from the type locality and one additional site, both in central Coahuila, Mexico. Although limited in distribution, it is quite dominant locally in small areas of rocky, coarse soils on flat hillside terraces (400–1,000 m).

SPECIMENS EXAMINED—MEXICO. Coahuila: 18 mi WSW of Villa Ocampo at Cuesta Zozaya, limestone E-W pass, on road to Laguna del Rey, *Henrickson & Dillon* 15602 (F, MEXU, TEX); Cuesta de Zozaya, 23 mi W of Ocampo, 12.5 mi E of Puertecitos, *Wendt & Lott* 1438 (TEX), 1873\* (TEX); Puerto del Guarache, in Sierra de Zacatosa, about 2.5 mi SW of Arocha, *Wendt & Lott* 1425 (TEX).

*Flourensia solitaria* is unique within the genus in possessing solitary, discoid capitula borne on long peduncles and achenes lacking the usual sericeous or villous pubescence.

This species occurs in very xeric and windblown habitats just above the *Flourensia cernua*-*Larrea tridentata* formation. Its associates include *Agave falcata*, *A. lecheguilla*, *Dasylyrion*, *Hechtia*, *Koebelinia*, and *Opuntia*.

7. *Flourensia microphylla* (A. Gray) S. F. Blake, Proc. Amer. Acad. Arts 49: 374. 1913. Figures 10, 18.

*Encelia microphylla* A. Gray, Proc. Amer. Acad. Arts 15: 37. 1879. TYPE: Mexico, Coahuila, gravelly hills near Saltillo, Aug. 1878, *C. C. Parry* 462 (holotype, GH!).

**Shrubs** to 1 m; stems much-branched, the bark grayish brown, densely hispid-pilose; branchlets purplish brown, striate. **Leaves** ovate to elliptic-ovate, 1.5–2.5 cm long, 0.5–1 cm wide, upper and lower surfaces strigillose, acute at each end, the margins entire, undulate, strigillose; petioles 1.5–4 mm long, hispid-pilose. **Capitulescences** solitary, terminal; peduncles 3–12 cm long, multi-bracteate. **Capitula** radiate, 10–15 mm high, 10–15 mm wide; involucre cylindrical; phyllaries 2–3-seriate, subequal, herbaceous, hispid-pilose, the outer narrowly lanceolate, 8–10 mm long, ca. 2 mm wide, apically acute, the inner lance-ovate to lance-obovate, 10–15 mm long, 2–2.5 mm wide, apically attenuate; paleae lanceolate, ca. 12–14 mm long, apically acute, ciliolate; ray florets ca. 10, neuter (rarely with a vestigial achene), the ligules oval to ovate, ca. 10 mm long, 4–6 mm wide; disc florets ca. 36, the corollas cylindrical, ca. 6 mm long, the tube 1–2 mm long, the lobes 0.5–0.8 mm long, puberulent. **Achenes** oblong-obovate, 4–6 mm

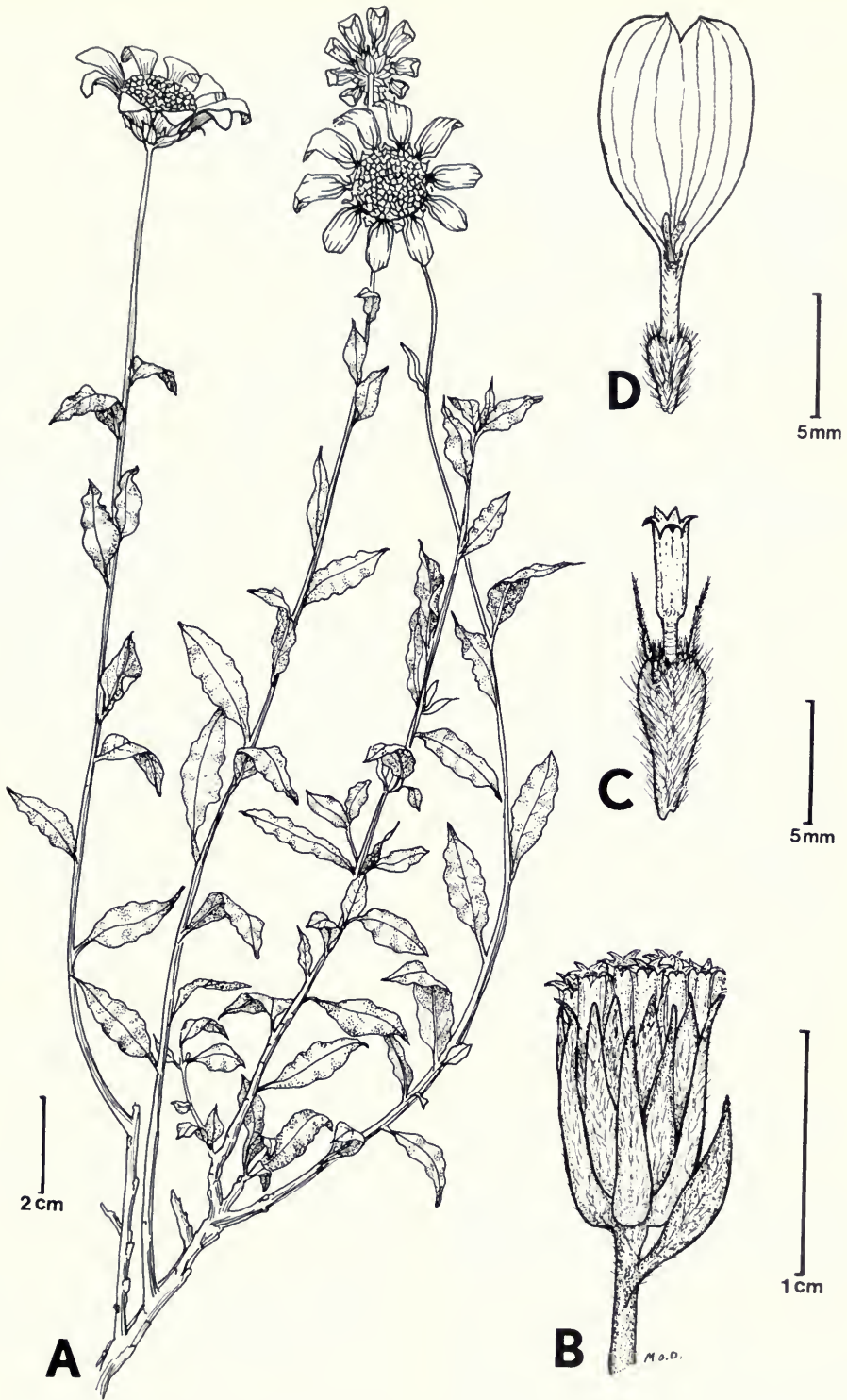


FIG. 10. *Flourensia microphylla* (from Palmer 795, F). A, habit; B, capitulum; C, disc floret; D, ray floret.

long, densely pilose-sericeous; pappus of 2 awns, ca. 3 mm long, caducous.

**FLOWERING (AND FRUITING) PERIOD**—September (October).

**DISTRIBUTION AND HABITAT** (FIG. 18)—Very rare and known from only a few collections from dry, limestone slopes of the mountains in south-eastern Coahuila, Mexico.

**SPECIMENS EXAMINED**—**MEXICO. Coahuila:** Sierra de San Marcos, opposite Los Fresnos, *Keil et al. P110B* (ASU); vicinity of Saltillo, *Palmer 795* (BM, F, GH, MO, MSC, NY, UC, US); Carneros Pass, *Pringle 2392* (BM, F, GH, MO, MSC, NY, UC, US); no exact locality, *Palmer 589* (GH).

*Flourensia microphylla* is unique among the North American species in possessing small ovate to elliptic-ovate leaves and solitary, radiate heads borne on long peduncles.

This rare species was re-discovered in 1969 by collectors (*Keil et al. P110B*, ASU) in the Sierra de San Marcos. This marked the first collection of this species since 1898.

Though the type collection of this species was cited as *C. C. Parry and E. Palmer 462* by A. Gray and subsequent authors, it is likely that 462 was solely a Parry collection. The type sheet at GH has only Parry's name on his personal label with the printed locality, "En route from San Luis Potosí to San Antonio, Texas." Moreover, Parry collected alone between April and the end of July (1878), a time when Palmer was in Mexico City. Parry left San Luis Potosí for his home in Iowa around the first of August, but fell ill and stayed in Saltillo for 10 days to recuperate (McVaugh, 1956). After Parry left, Palmer collected exclusively in the state of San Luis Potosí for the next three months.

8. *Flourensia collodes* (Greenman) S. F. Blake, Proc. Amer. Acad. Arts 49: 373. 1913. Figures 11, 14.

*Encelia collodes* Greenman, Proc. Amer. Acad. Arts 39: 110. 1903. TYPE: Mexico, Chiapas, along road from Ocuilapa to Tuxtla, 2,100–3,000 ft, 29 Aug. 1895, *E. W. Nelson 3071* (holotype, GH!; isotype, US!).

Arborescent shrubs to 4 m tall; stems grayish brown; branchlets striate, pilose to glabrescent. Leaves lance-ovate to ovate, 6–14 cm long, 2.2–6.4 cm wide, mostly falcate, upper surface sparsely strigillose, lower surface glabrous, basally oblique,

rounded, apically acute to attenuate, the margins entire, strigillose; petioles 7–20 mm long, strigillose. Capitulescences weakly cymose, 4–5-headed; peduncles 2–8 cm long, bracteate. Capitula radiate, ca. 1.5 cm high, ca. 2 cm wide; involucre hemispheric; phyllaries 3–4-seriate, imbricate, indurate, striate, the outer lanceolate, 4–6 mm long, 1–1.5 mm wide, apically acute, subherbaceous, ciliolate, the inner oblanceolate, 7–10 mm long, 1.5–2 mm wide, apically acute to obtuse; paleae oblong, 12–15 mm long, apically subcucullate, rounded, erose, ciliolate; ray florets (12–) 13 (–16), neuter (rarely styloferous), the ligules narrowly elliptic, 15–22 mm long, 5–8 mm wide, the tube 5–6 mm long, glabrous; disc florets 30–100, the corollas cylindrical, ca. 6 mm long, the tube 1–1.5 mm long, the lobes 0.6–1 mm long. Achenes obconical to cuneate, 6–10 mm long, sericeous on margins, the faces glabrate, reddish brown; pappus of 2 awns, 4–7 mm long, persistent, basally ampliate, lacerate. Chromosome number:  $n = 18$ .

**FLOWERING (AND FRUITING) PERIOD**—August–October (November–December).

**DISTRIBUTION AND HABITAT** (FIG. 14)—Infrequent on thin, rocky soils in the Tropical Deciduous Forest in the extreme southern portion of the Mesa del Sur, Oaxaca, and the Central Depression of Chiapas, Mexico (400–1,000 m).

**SPECIMENS EXAMINED**—**MEXICO. Chiapas:** 5 km E of Berriozabal on Mex Hwy 190, *Breedlove 20388* (DS). **Oaxaca:** 100 mi SE of Oaxaca, 54 mi NE of Tehuantepec, *Cronquist & Sousa 10453* (ENCB, GH, MICH, MCS, US); 45 mi SE of Oaxaca, *Dillon & Reynolds 696* (F, HUT, MEXU, TEX); San Pedro Oscurana, *MacDougall s.n.* (US); San Pedro Istmo, *MacDougall s.n.* (US).

*Flourensia collodes* is distinguished by its large, falcate, lance-ovate leaves and capitula with (12–) 13 (–16) ray florets. Its associates include *Bursera*, *Ceiba*, and *Heliocarpus*.

Although, in Greenman's description, he cited the type collection as *Nelson 307*, it is clearly marked as 3071 on the holotype and isotype specimens.

9. *Flourensia glutinosa* (Robinson & Greenman) S. F. Blake, Proc. Amer. Acad. Arts 49: 374. 1913. Figures 12, 14.

*Encelia glutinosa* Robinson & Greenman, Amer. J. Sci. III. 50: 1955. 1895. TYPE: Mexico, Oaxaca, Las Hoyas Canyon, 4,500 ft, 2 Nov. 1894, *C. G.*

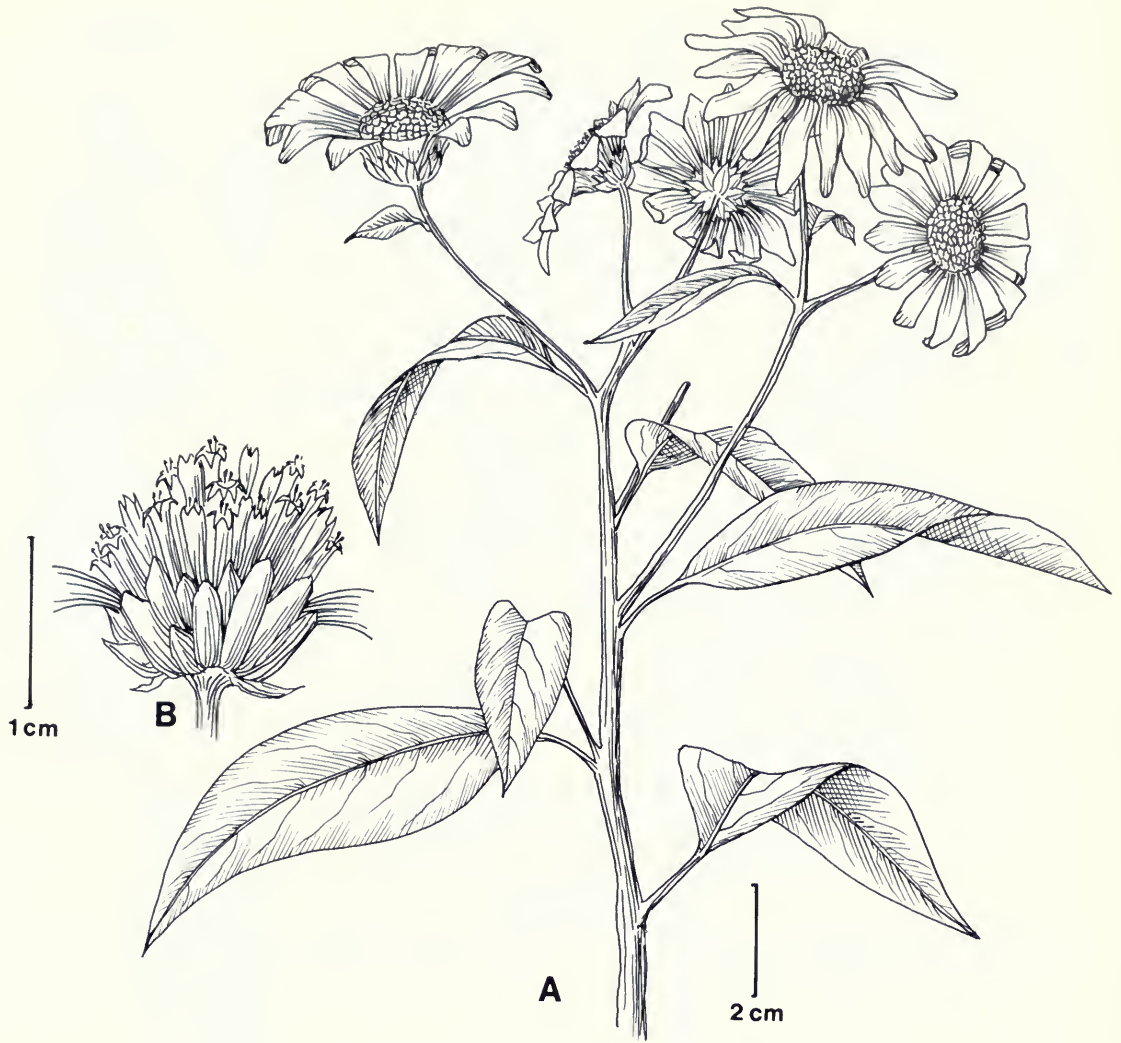


FIG. 11. *Flourensia collodes* (from Dillon & Reynolds 696, f). A, habit; B, capitulum.

*Pringle 6024* (holotype, GH!; isotypes, A!, BM!, MO!, MSC!, NY!, UC!, US!).

Arborescent shrubs to 5 m tall, the bark gray, furrowed; branchlets pilose-lanate. Leaves ovate to ovate-lanceolate, 4.5–13 cm long, 1.5–3.8 cm wide, falcate, upper surface minutely strigillose, lower surface glabrous, basally cuneate, apically acuminate, the margins entire, strigillose; petioles 2–4 mm long, lanate-pilose to glabrescent. Capitulescences cymose-paniculate, 5–20-headed; peduncles 2–5 cm long, striate, puberulent, bracteate. Capitula radiate, 1–1.5 cm high, ca. 1 cm

wide; involucre hemispheric; phyllaries 3–4-seriate, imbricate, indurate, striate, the outer lanceolate, 2–3.5 mm long, 0.6–1 mm wide, apically acute, ciliolate, the inner oblong-lanceolate, 3–5.5 mm long, 1–1.5 mm wide, apically attenuate to obtuse, ciliolate; paleae oblanceolate, 8–11 mm long, apically truncate and crested with two scarious wings, ciliolate; ray florets 7–10, the ligules oblong-oval, 11–23 mm long, 5–7 mm wide, the tube pilose; disc florets ca. 40, the corollas cylindrical, ca. 7 mm long, the tube ca. 1.5 mm long, the lobes ca. 1.5 mm long. Achenes obconical to narrowly cuneate, 6.5–11 mm long, sericeous-pi-



FIG. 12. *Flourensia glutinosa* (from Dillon & Reynolds 678, f). A, habit; B, capitulum; C, disc floret.

lose; pappus of 2 (rarely 4) awns, 2–5 mm long, occasionally deciduous.

FLOWERING (AND FRUITING) PERIOD—October–November (November–December).

DISTRIBUTION AND HABITAT (FIG. 14)—Infrequent on limestone and shale slopes in the valleys of the Mesa del Sur of southern Puebla and western Oaxaca (1,400–1,600 m).

SPECIMENS EXAMINED—MEXICO. Oaxaca: 50 km NNW of Teliztlahuaca, along road to Tehuacán, Cronquist & Fay 10923 (ENCB, F, GH, MICH, MSC, NY, TEX, US); 6 mi above Domiquillo, Nelson 1832 (GH, US). Puebla: 14 mi NW of Huajuapán de León, Dillon & Reynolds 678 (F, GH, HUT, MEXU, MO, NY, TEX, US).

*Flourensia glutinosa* is distinguished by its arborescent habit and 5–20-headed, cymose-panicu-



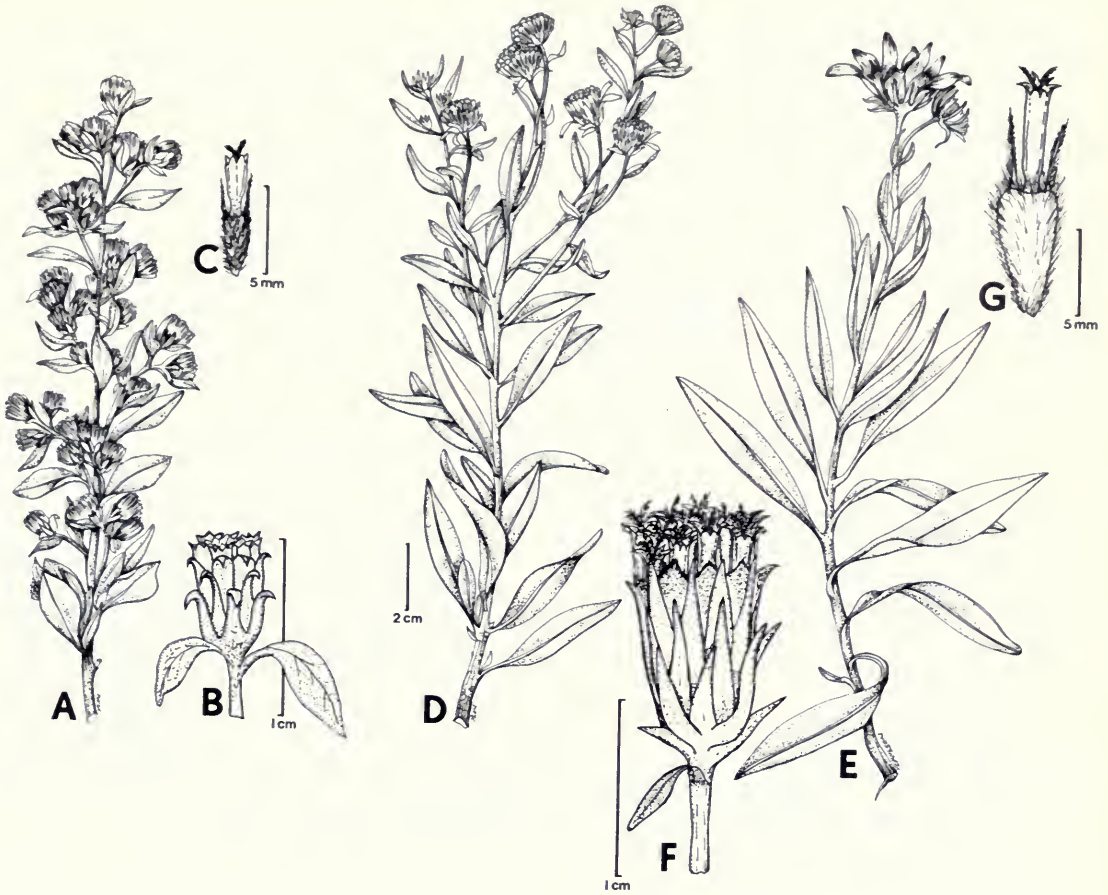


FIG. 13. A-C, *Flourensia cernua* (from Cronquist 11262, MO). A, habit; B, capitulum; C, floret. D, *F. cernua* × *F. resinosa* (from Cronquist 11263, MO). E-G, *F. resinosa* (from Cronquist 9626, MO). E, habit; F, capitulum; G, disc floret.

late capitulescences. Its associates include *Brahea*, *Opuntia*, and *Tithonia*.

10. *Flourensia resinosa* (Brandegee) S. F. Blake, Proc. Amer. Acad. Arts 49: 375. 1913. Figures 13, 14.

*Encelia resinosa* Brandegee, Zoe 5: 240. 1906. TYPE: Mexico, Hidalgo, Ixmiquilpan, mountains, Aug. 1905, C. A. Purpus 1458 (holotype, UC!; isotypes F!, GH!, MO!, NY!).

**Shrubs** to 2 m tall, the bark grayish brown to black; branchlets reddish brown, striate. **Leaves** lanceolate to narrowly oblong-elliptic, 3.5–7 cm long, 0.8–1.8 cm wide, upper and lower surfaces

sparsely strigillose, basally acute to cuneate, apically acute, the margins entire, strigillose; petioles 2–4 mm long. **Capitulescences** weakly cymose, 2–4 (–5)-headed; peduncles 2–7 mm long, bracteate. **Capitula** radiate, 11–17 mm high, 10–17 mm wide; involucre hemispheric; phyllaries 3-seriate, subequal, herbaceous, narrowly lanceolate, 5–9 mm long, 1–2 mm wide, apically acute to acuminate; paleae oblanceolate, 8–12 mm long, apically acute to acuminate; ray florets ca. 10, the ligules oblong, 13–22 mm long, 5–9 mm wide, the tube puberulent; disc florets 30–50, the corollas cylindric, 6–7 mm long, the tube ca. 1 mm long, the lobes ca. 1 mm long. **Achenes** obconical to cuneate, ca. 8 mm long, the margins sericeous, the faces sparsely sericeous, glabrescent; pappus to 2 awns, 3–5 mm long, persistent. Chromosome number:  $n = 18$ .

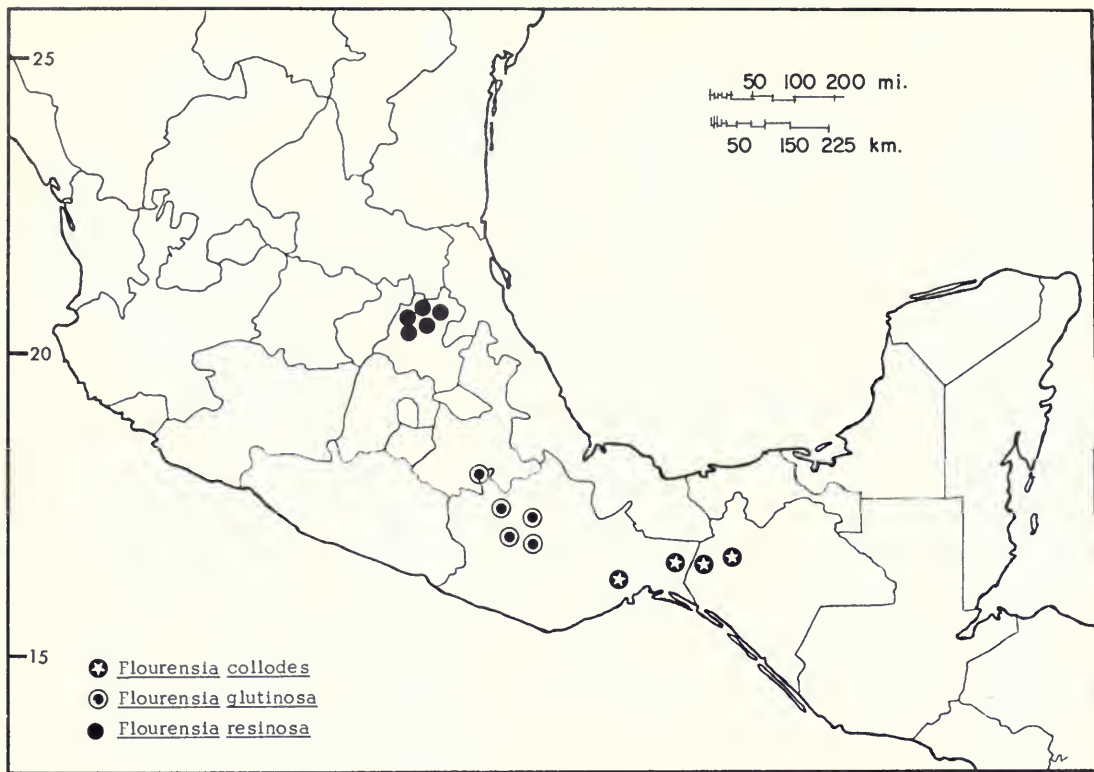


FIG. 14. Distribution of *Flourensia collodes*, *F. glutinosa*, and *F. resinosa*.

FLOWERING (AND FRUITING) PERIOD—June–November (December–January).

DISTRIBUTION AND HABITAT (FIG. 14)—Dominant locally on low, arid, limestone hillsides in the vicinity of Ixmiquilpan, Hidalgo, Mexico (1,000–1,900 m). This region is considered a southern extension of the Chihuahuan Desert (Rzedowski, 1973).

REPRESENTATIVE SPECIMENS EXAMINED—MEXICO.

**Hidalgo:** 12 km SE of Ixmiquilpan, *Chiang et al. 855* (BM, F); 7 mi SE of Ixmiquilpan, *Cronquist 9626* (GH, MICH, MO, TEX, US); 10 mi SE of Ixmiquilpan, *Dillon & Reynolds 676* (F, MEXU, MO, NY, TEX); 6 mi S of Ixmiquilpan, *Graham & Johnston 4758\** (TEX); El Capulin, between Actopan and Ixmiquilpan, *Moore 1265* (BM, GH, MICH, US); ca. 2 mi W of Villagran, *Quintero 2006* (TEX); 38 mi NW of Pachuca, *Waterfall & Wallis 14098* (US).

*Flourensia resinosa* is distinguished by its extremely resinous, lanceolate to elliptic leaves and long-pedunculate capitula with 10 ray florets. Its associates include *Agave*, *Dasyllirion*, *Hechtia*, *Opuntia*, *Yucca*, and *Zaluzania*.

It is sympatric with *Flourensia cernua* at lower elevations within its distribution. Cronquist collected what he believed to be a hybrid from an area 15 km southeast of Ixmiquilpan (11263; F, GH, MO, NY, TEX, US). This specimen has characteristics intermediate between its supposed parents. Table 2 and Figure 13 compare these taxa. Further sampling will be necessary to assess the extent and direction of hybridization at this locality.

Schultz Bipontinus (ca. 1840) annotated *Ehrenberg 1564* (B), from the vicinity of Ixmiquilpan, as *Flourensia glutinosa* sp. nov.; however, he provided no description. Around 1914, Blake annotated the specimen as *F. schultzei*, since the epithet *glutinosa* was preoccupied, but also provided no description. In his revision, Blake (1921) recognized the specimen as *F. resinosa*, and from an examination of a photograph of that collection, I agree with Blake's placement.

Label data from *Moore 1265* indicate possible use of this species by local peoples as "edible exudate chewed like chicle."

Although Brandegec cited *Purpus* 1456 as the type in the original description, the correct number of the collection is 1458.

11. *Flourensia monticola* Dillon, Southw. Naturalist 21: 147. 1976. TYPE: Mexico, Coahuila, dry, limestone and shale slopes, 13.5 km E of Los Lirios, 24 km W of La Jacinta (N.L.) very near Nuevo León state line, 2,150 m, 7 Nov. 1972, *F. Chiang, T. Wendt, & M. C. Johnston 10130* (holotype, TEX!; isotype, MEXU!). Figures 15, 18.

**Shrubs** to 2 m tall; stems much-branched from base, ascending, the bark black. **Leaves** lanceolate to obovate, 6–11.5 cm long, 2–4.5 cm wide, crowded at tips of branchlets, upper and lower surfaces sparsely strigillose, basally acute to cuneate, apically acute, obtuse, or occasionally re-tuse, the margins entire, strigillose; petioles 1.8–2.2 cm long. **Capitulescences** solitary (rarely 2-headed), terminal on branchlets; peduncles 4–11 cm long, bracteate. **Capitula** radiate, 1.2–1.5 cm high, 1.5–2 cm wide; involucre hemispheric; phyllaries 3-seriate, subequal, herbaceous, the outer lanceolate, 9–13 mm long, 2–2.5 mm wide, apically acute to attenuate, the inner ovate-lanceolate to oblong, 11–16 mm long, 2.5–3 mm wide, apically acute to acuminate; paleae oblanceolate, ca. 1 cm long, apically acute to attenuate; ray florets (10–) 13 (–15), the ligules oblong, 20–30 mm long, 5–7 mm wide; disc florets ca. 50, the corollas cylindrical-campanulate, ca. 8 mm long, the tube ca. 1.5 mm long, the lobes ca. 1.5 mm long. **Achenes** obconical to cuneate, 8–9 mm long, the margins sericeous, the faces sparsely sericeous, glabrescent; pappus of 2 awns, ca. 5 mm long, persistent. Chromosome number:  $n = 18$ .

**FLOWERING (AND FRUITING) PERIOD**—July–November (November–December).

**DISTRIBUTION AND HABITAT** (FIG. 18)—Known from three localities in canyons of the northern Sierra Madre Oriental (ca. 2,150 m). This apparently local species is found on dry, southwest-facing limestone and shale slopes.

**SPECIMENS EXAMINED**—**MEXICO, Coahuila:** Cañón de Los Lirios, 10 mi E of Los Lirios, on road to La Jacinta, N.L., and Cola de Caballo, *Dillon & Hartman 656\** (F, HUT, MEXU, MO, NY, TEX). **Nuevo León:** Cañón del Diente, S of Monterrey, *C. H. & M. T. Mueller 252* (F, GH, MEXU, TEX); near Monterrey, *Smith M275* (TEX); Cerro de La Silla, *White & Chatters 9* (MEXU, MICH).

TABLE 2. Distinguishing characteristics of *Flourensia cernua*, *F. resinosa*, and a putative hybrid (values are given for the entire range of the taxa).

Character	<i>F. cernua</i>	Putative hybrid	<i>F. resinosa</i>
Leaf length (cm)	ca. 1.7–2.5	2.5–3.5	3.5–7
Peduncles (cm)	ca. 1	1–5	2–7
Ray florets	Absent	1–7 or absent	ca. 10
Ligules length (cm)	Absent	< 1	1.3–2.2
% Pollen stainability (> 500 grains each)	> 90	ca. 36	> 90

*Flourensia monticola* is distinguished from *F. resinosa* and *F. pulcherrima*, its nearest relatives, by possessing wider leaves and capitula that are intermediate in size. In the vicinity of the type locality, it is associated with *Agave*, *Pinus*, and *Quercus*.

12. *Flourensia pulcherrima* Dillon, Southw. Naturalist 21: 145. 1976. TYPE: Mexico, Durango, steep limestone slopes, N end of Sierra de Rosario, ca. 20 km SW of Mapimi and 3 km E of Santa Librada, 2,000 m, 25 June 1973, *M. C. Johnston, F. Chiang, & T. Wendt 11469\** (holotype, TEX!; isotype, MEXU!). Figures 16, 18.

**Shrubs** to 1.5 m tall; stems much-branched basally, the bark black. **Leaves** lanceolate to narrowly elliptic, (5–) 8–12 (–15) cm long, 2–3 cm wide, upper and lower surfaces puberulent, attenuate at both ends, the margins entire. **Capitulescences** solitary, terminal on branchlets, or weakly cymose, 3–5-headed; peduncles 1–6 cm long, bracteate. **Capitula** radiate, 1.5–2 cm high, 1.3–2 cm wide; involucre broadly hemispheric; phyllaries 2-seriate, the outer linear to lanceolate, 18–20 mm long, 2–3 mm wide, the inner ovate-lanceolate, 10–12 mm long, 2–3 mm wide, all basally indurate, all apically attenuate, herbaceous, puberulent, reflexed in fruit; paleae oblanceolate, 10–15 mm long, apically acute to attenuate, ciliate; ray florets ca. 13, the ligules oblong, 22–26 mm long, 5–6 mm wide, the tube ca. 6 mm long, sericeous; disc florets 50–60 (–150), the corollas cylindrical, 6–7 mm long, the tube ca. 1 mm long, the lobes ca. 1 mm long. **Achenes** obconical, 7–9 mm long, the margins sericeous, the faces short-sericeous, glabrescent;



FIG. 15. *Flourensia monticola* (from Chiang, Wendt, & Johnston 10130, TEX).



FIG. 16. *Flourensia pulcherrima* (from Johnston, Chiang, & Wendt 11469, TEX).

pappus of 2 awns, 3–5 (–6) mm long, persistent. Chromosome number:  $n = 18$ .

FLOWERING (AND FRUITING) PERIOD—June–October (October–November).

DISTRIBUTION AND HABITAT (FIG. 18)—Found on steep, limestone slopes in the mountains associated with the Bolsón de Mapimi in eastern Chihuahua, northeastern Durango, and southwestern Coahuila, Mexico (1,500–2,100 m).

SPECIMENS EXAMINED—**MEXICO. Chihuahua:** Sierra de las Pampas, *Chiang et al. 8836* (TEX); 20 km ENE of Cd. Jiménez, NW of summit of Sierra de Chupaderos, *Henrickson 13754* (TEX). **Coahuila:** ca. 26 mi SE of Torreón, Sierra de Jimulco, *Henrickson 13130* (TEX); Sierra de Jimulco, *Johnston et al. 11506* (TEX). **Durango:** N end of Sierra del Rosario, ca. 20 km SW of Mapimi, *Dillon & Hartman 647* (F, MO, TEX); Sierra del Rosario, *Wendt et al. 10014* (TEX).

*Flourensia pulcherrima* is distinguished by its narrowly lanceolate to elliptic leaves and long phyllaries, often overtopping the disc. Its associates include *Agave*, *Dasylyrion*, *Fouquieria*, and *Yucca*.

13. *Flourensia pringlei* (A. Gray) S. F. Blake, Proc. Amer. Acad. Arts 49: 375. 1913. Figures 17, 18.

*Helianthella pringlei* A. Gray, Proc. Amer. Acad. Arts 21: 389. 1886. TYPE: Mexico, Chihuahua, rocky hills near Chihuahua City, 7 Sept. 1885, *C. G. Pringle 646* (holotype, GH!; isotypes, BM!, F!, MO!, NY!, US!).

*Encelia oblonga* Robinson & Fern., Proc. Amer. Acad. Arts 30: 118. 1894. TYPE: Mexico, Chihuahua, plains near Casas Grandes, 10 Oct. 1891, *C. V. Hartman 812* (holotype, GH!; isotype, us!).

Suffruticose **subshrubs** to 1 m tall; stems erect; usually unbranched, yellowish green. **Leaves** elliptic to oblong-lanceolate (2–) 5–10 cm long, 1–4.3 cm wide, upper and lower surfaces strigose, basally cuneate, apically acute to rounded, the margins entire, strigose. **Capitulescences** solitary, terminal; peduncles 5–11 cm long, bracteate. **Capitula** radiate, 1–2 cm high, 1.5–2.5 cm wide; involucre broadly hemispheric, subtended by calyculate, foliaceous bracts; phyllaries ca. 2-seriate, linear from ovate base, 10–30 mm long, 1.5–2 mm wide, apically attenuate, ciliolate; paleae oblanceolate, ca. 11 mm long, apically acute to obtuse; ray florets 13–21, the ligules oblong to oval, 10–16 mm long, 3–4 mm wide, the tube 5–7 mm long, sericeous; disc florets 40–50, the corollas cylindrical, ca. 6.5

mm long, the tube ca. 1 mm long, the lobes ca. 1 mm long. **Achenes** cuneate, ca. 12 mm long, 4–8-ribbed, subterete, sericeous, pappus of 2 awns, ca. 4 mm long, persistent or disarticulating.

FLOWERING (AND FRUITING) PERIOD—August–October (September–October).

DISTRIBUTION AND HABITAT (FIG. 18)—Known from rocky foothills of the eastern Sierra Madre Occidental from southwestern New Mexico, United States, and central Chihuahua to central Durango, Mexico (1,500–2,100 m).

SPECIMENS EXAMINED—**MEXICO. Chihuahua:** Rancho Tepehuanes, Namiquipa, *Enríquez 207* (F, TEX); 4 mi S of Matamoros, *Gentry & Arguelles 17927* (TEX, US); 4.6 mi NE of Buenaventura, *Oliver et al. 542* (MO); hills near Chihuahua, *Pringle 1056* (F, MO, MSC, NY, UC). **Durango:** El Oro to Guanacevi, *Nelson 4730* (US); vicinity of Santiago Papasquiario, *Palmer 425* (BM, F, GH, MO, NY, UC, US). **UNITED STATES. New Mexico:** Hidalgo Co.: along SW side of Alamo Hueco Mts., *R. & M. Spellenberg 3861* (NY, TEX).

*Flourensia pringlei* is distinguished by its suffruticose habit with 6–12 erect, leafy stems and large capitula with long linear phyllaries. In southwestern New Mexico, it is found on severely overgrazed slopes that are eroded down to cobblestone. Its associates in this area include *Fouquieria*, *Jatropha macrorhiza*, *Juniperus*, *Pectis filipes*, *P. prostrata*, *Portulaca suffrutescens*, *Quercus arizonica*, *Talinum paniculatum*, and *T. parviflorum* (R. Spellenberg, pers. comm.).

14. *Flourensia thurifera* (Molina) DC., Prodr. 5: 592. 1836. Figures 19, 20.

*Helianthus thurifera* Molina, Sagg. Stor. Nat. Chil. 160. 1782. TYPE: Chile, Valparaíso, vicinity of Valparaíso, *Molina s.n.* The holotype has not been located at Bolo where it may have originally been deposited. NEOTYPE: Chile, Valparaíso, sonnige Abhänge, 7 Oct. 1895, *Buchtien s.n.* (neotype, us!, photograph, F!; isoneotype, GH!, photograph, F!).

*Diomedea thurifera* (Molina) Bertero ex Colla, Mem. Acad. Sci. Torino 38: 37. 1835.

*Helianthus glutinosus* Hook. & Arn., Bot. Beechey Voy. p. 32. 1830. TYPE: Chile, Valparaíso, *T. Bridges s.n.* (holotype, GL, not seen).

*Flourensia besseriana* Meyen & Walp., Nov. Act. Aca. Caes. Leop. Carol. 19: 270. TYPE: Chile, no exact locality, *B. Besser s.n.* (holotype, B, destroyed; lectotype, here designated, fragment, GH!; photograph of B specimen, F!, GH!).

*Helianthus besseriana* (Meyen & Walp.) Benth. & J. D. Hook. ex J. D. Hook. & A. B. Jackson, Ind. Kew. 1: 1112. 1893.



FIG. 17. *Flourensia pringlei*. A, habit (from Pringle 1056, F); B, capitulum (from Palmer 425, F).



FIG. 18. Distribution of *Flourensia microphylla*, *F. monticola*, *F. pringlei*, and *F. pulcherrima*.

*Flourensia thurifera* var. *lanceolata* Remy in Gay, Hist. Chil. 4: 288. 1849. TYPE: P, not seen.

**Shrubs** to 2 m tall; stems erect, the bark brown; branchlets reddish brown, puberulent. **Leaves** ovate to oblong-elliptic, 5.5–11.5 cm long, 1.5–4 cm wide, upper and lower surfaces strigillose, basally cuneate, apically subacuminate to obtuse, the margins shallowly repand-dentate with 4–10 pairs of triangular, mucronate teeth (rarely subentire), strigillose; petioles 3–9 mm long, villosulose. **Capitulescences** cymose, 4–8-headed; peduncles 3–13 cm long, bracteate. **Capitula** radiate, 10–15 mm high, 14–25 mm wide; involucre hemispheric;

phyllaries 2–3-seriate, subequal, herbaceous, densely to sparsely villous, lanceolate to oblong-spatulate, 6–17 mm long, 1–3 mm wide, apically acute to acuminate, mucronulate; paleae oblanceolate 9–10 mm long, apically obtuse to rounded, often puberulent; ray florets ca. 13, the ligules oval to oblong-oval, 14–30 mm long, 5–10 mm wide, the tube villosulose; disc florets ca. 50, the corollas slender-funnelform, ca. 6.5 mm long, the tube ca. 2 mm long, the lobes ca. 0.6 mm long, puberulent. **Achenes** oblong-cuneate to obconical, 7–8 mm long, densely sericeous; pappus of 2–3 (rarely 4) awns, 3–4 mm long, basally ampliate, persistent. Chromosome number:  $2n = 36$ .





FIG. 19. *Flourensia thurifera* (from Behn s.n., F). A, habit; B, capitulum; C, disc floret.

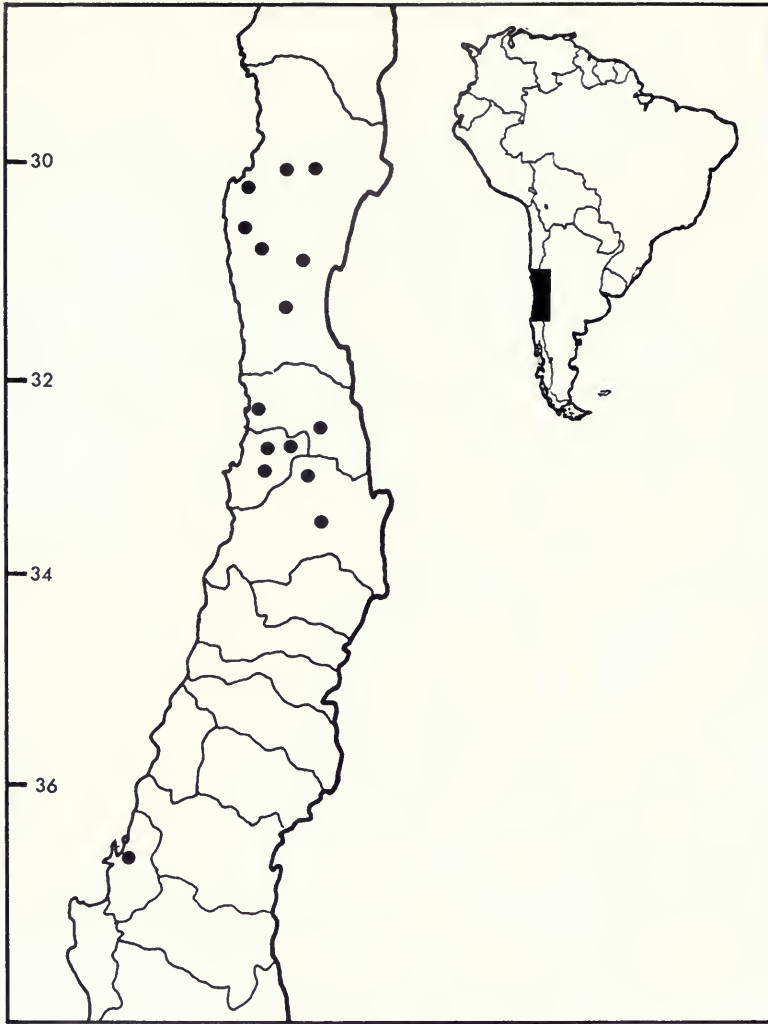


FIG. 20. Distribution of *Flourensia thurifera*.

FLOWERING (AND FRUITING) PERIOD—August–November (November–December).

DISTRIBUTION AND HABITAT (FIG. 20).—Frequent in the evergreen sclerophyllous scrub of coastal Chile from Coquimbo, south to Santiago, and one collection from near Concepción (400–1,000 m).

VERNACULAR NAMES—*Flor del incienso*, *incienso*, *maravilla*, *maravilla del campo*, *maravilla del cerro*.

REPRESENTATIVE SPECIMENS EXAMINED—CHILE. **Aconcagua:** San Felipe, *Claude-Joseph* 1353 (US); Quemados to Zapallar, *Kausel* 2578 (LIL); between Calera and San Felipe, *Killip & Pisano* 39769 (US). **Concepción:**

*Tome, Vera* 25 (LIL). **Coquimbo:** 40 km S of La Serena, *Cabrera* 12582 (LP); Cuesta Los Hornos, ca. 10 km from Illapel, *Kausel* 4597 (LP); Tulahuén, *Geisse* s.n. (GH); Fray Jorge, *Jiles* 306 (SI), 707 (LIL); Tongoycillo, *Jiles* 1519 (LP); Zorrilla, *Jiles* 1623 (LIL); Quebrada de Lamarones, S of La Serena, *Solbrig* 3043 (GH); Vicuña, *Wagenknecht* 18471 (F, GH, UC, MO); Rivadavia, *Werdermann* 90 (A, BM, F, GH, LIL, NY, SI, UC). **Santiago:** Cerro San Cristobal, *Cabrera* 11330 (LP); Santiago, *Claude-Joseph* 922 (US); Tiltil, *Grandjot* s.n. (MO); Cerro de Renca, *Looser* 2942 (TEX). **Valparaíso:** Valparaíso, *Bertero* 954 (BM, F, GH, MO); Llay-Llay, *Cabrera* 12516 (LP); Marga-Marga, *Jaffuel* 3659 (GH); Limache, *Looser* 627 (GH).

*Flourensia thurifera* is distinguished by its large ovate to oblong-elliptic, shallowly repand-dentate

leaves, foliaceous phyllaries, and large capitula and rays. There is considerable variation in leaf shape and size that is presumably environmentally induced; capitular morphology is quite constant.

15. *Flourensia macrophylla* S. F. Blake, Bot. Jahrb. Syst. 54: 47. 1916. TYPE: Peru, Lima, Huarochiri, stony places, 2,370–2,650 m, along Lima-Oroya Railroad, between Matucana and Tambo de Viso, 26 Dec. 1901, *A. Weberbauer 119* (holotype,  $\bar{v}$ , destroyed; lectotype, here designated, fragment, GH!; photograph of  $\bar{v}$  specimen,  $\bar{f}$ !, GH!). Figures 21, 26.

**Shrubs** to 2 m; stems much-branched, the bark black; branchlets reddish brown, puberulent. **Leaves** oval to oblong-oval, 5–10 cm long, 2–4 cm wide, upper and lower surfaces glabrous, basally broadly cuneate, apically obtuse to rounded, the margins shallowly cuspidate-denticulate, strigillose, the lower third entire; petioles 2–5 mm long, strigillose. **Capitulescences** cymose-paniculate, 3–6-headed; peduncles 3–6 cm long, bracteate. **Capitula** radiate, 9–12 mm high, 10–11 mm wide; involucre campanulate; phyllaries 2–3-seriate, subequal, herbaceous, the outer lanceolate to oblanceolate, 5–8 mm long, 1.5–2.5 mm wide, apically acute, ciliolate, the inner oblanceolate to narrowly rhombic-obovate, apically acute, ciliolate; paleae oblanceolate, ca. 8 mm long, apically subcucullate to truncate, fimbriate; ray florets ca. 8, the ligules oval to oblong, 14–20 mm long, ca. 5 mm wide, the tube ca. 4 mm long, villosulose; disc florets 10–30, the corollas cylindrical-funnelform, ca. 5 mm long, the tube ca. 1 mm long, the lobes ca. 0.6 mm long. **Achenes** obconical, ca. 5 mm long, densely sericeous; pappus of 2 awns, ca. 4 mm long, persistent.

**FLOWERING (AND FRUITING) PERIOD**—December–March (March–May).

**DISTRIBUTION AND HABITAT** (FIG. 26)—Scattered populations on dry, rocky slopes along the western Cordillera of the Andes from northern to central Peru (2,500–3,500 m).

**VERNACULAR NAMES**—*Carcarillo, sámana, uño*.

**REPRESENTATIVE SPECIMENS EXAMINED**—**PERU**. **An-cash**: Bolognesi, ca. Chiquián, *Cerrate 103* (USM), *Ferreya 5668* (US, USM); Carhuaz, *Infantes 1122* (LIL); Huaraz, 4 km S of Huaraz, Río Santa Valley, *Dillon et al. 3171* (BM, F, GH, HUT, MEXU, MO, NY, TEX, US, USM); Huaylas, Caráz, *Ferreya 14615* (US, USM); Recuay, Mar-ca, *Richardson 2087* (BM, F, MO, TEX); Yungay, between

Carhuaz and Yungay, *Ferreya 14337* (USM). **La Libertad**: Santiago de Chuco, Los Quengos, *López 435* (LIL, LP, USM), *970* (HUT). **Lima**: Huarochiri, KM 86 near Matucana, *Ferreya 7014* (US, USM); Matucana, *Macbride 2929* (F), *Macbride & Featherstone 247* (F, GH, US).

*Flourensia macrophylla* is readily distinguished by its large oval or oblong-oval, regularly denticulate leaves and small capitula with ca. 8 ray florets. The size of the leaves and capitula vary; smallest individuals occur in the north and larger ones to the south.

16. *Flourensia angustifolia* (DC.) S. F. Blake, Contr. U.S. Natl. Herb. 20: 407. 1921. Figures 22, 26.

*Flourensia thurifera* var. *angustifolia* DC., Prodr. 5: 592. 1836. TYPE: Peru, Junín, Tarma, *J. Dombey 24* pro parte (lectotype, here designated, G-DC, IDC Microfiche 800. 952: I. 1!; isotype,  $\bar{v}$ , destroyed; photograph of  $\bar{v}$  specimen,  $\bar{f}$ !). There appear to be two taxa in the first frame of the microfiche. The Dombey specimen to the right is clearly marked and is here chosen as the lectotype. DeCandolle listed Dombey, Haenke, and Nee in the protologue, but the last two collectors do not have representative material in the microfiche. Dombey's collection is labeled "Chile" in G-DC, but the  $\bar{v}$  specimen was marked as from Tarma, unquestionably the origin of this plant.

**Shrubs** to 2 (–3) m tall; branchlets resinous, reddish brown. **Leaves** lanceolate to oblong-lanceolate, 8–13 cm long, 1.5–2 cm wide, upper and lower surfaces glabrous, basally and apically acute to acuminate, the margins shallowly cuspidate with lower  $\frac{1}{3}$  entire, strigillose; petioles 2–5 mm long, strigillose. **Capitulescences** cymose, 3–6-headed; peduncles 1–6.5 cm long, bracteate. **Capitula** radiate, 8–10 mm high, 8–15 mm wide; involucre hemispheric to campanulate; phyllaries 2–3-seriate, subequal, herbaceous, lanceolate to linear-lanceolate, 4–9 mm long, 1–2 mm wide, apically acute to attenuate, ciliolate; paleae oblanceolate, 9–12 mm long, apically acute to subcucullate; ray florets ca. 8, the ligules oblong to oval, 13–20 mm long, 5–8 mm wide, the tube ca. 5 mm long, villosulose; disc florets 30–40, the corollas cylindrical-campanulate, 6–7 mm long, the tube ca. 1.5 mm long, the lobes 0.6 mm long. **Achenes** obconical, 6–8 mm long, densely sericeous; pappus of 2 awns, 3–5 mm long, persistent. Chromosome number:  $n = 18$ .

**FLOWERING (AND FRUITING) PERIOD**—December–April (February–June).

**DISTRIBUTION AND HABITAT** (FIG. 26)—Abun-



FIG. 21. *Flourensia macrophylla* (from Macbride 2929, F). A, habit; B, capitulum; C, disc floret.



FIG. 22. *Flourensia angustifolia* (from Killip & Smith 21792, F). A, habit; B, capitulum; C, disc floret.

dant on clay or serpentine soils within the intermontane valleys of the Cordillera Central in central Peru (1,700–3,300 m).

VERNACULAR NAMES—*Aserijaeba*, *pfanca*.

REPRESENTATIVE SPECIMENS EXAMINED—**PERU.** **Huánuco:** Huánuco, near Huánuco, *Kanehira* 77 (F, GH). **Junín:** Tarma, Tarma, Cerro San Bartolome, *Dillon & Rodriguez* 449\* (F, HUT, TEX, USM), *Dillon & Turner* 1317 (F, MO, TEX, USM); Tarma, *Macbride & Featherstone* 1018 (F, GH, US); between Acobamba and Tarma, *Stork* 10951 (F, UC); Acobamba, *Woytkowski* 54 (F).

*Flourensia angustifolia* is distinguished by its narrowly oblong-lanceolate leaves with shallowly cuspidate margins and small capitula with ca. 8 ray florets. Its associates include *Acacia*, *Opuntia*, and *Prosopis*.

17. **Flourensia peruviana** Dillon, Ann. Missouri Bot. Gard. 68: 108. 1981. TYPE: Peru, Huancavelica, Huancavelica, Checcyancu, al 4 km E de Conaica, 3,000–3,500 m, 14 March 1971, *O. Tovar* 193 (holotype, US!; isotypes, F!, LP!, USM!). Figures 23, 26.

**Shrubs** to 2 m tall. **Leaves** lanceolate to oblong-lanceolate, (5–) 7–10 (–12) cm long, (1–) 1.5–2 (–3) cm wide, upper and lower surfaces glabrous, basally broadly cuneate, apically acute to obtuse, the margins entire, strigillose; petioles (2–) 4–8 (–10) mm long. **Capitulescences** cymose-paniculate, 4–20-headed; peduncles 5–50 mm long, bracteate. **Capitula** radiate, ca. 10 cm high, 7–10 mm wide; involucre hemispheric; phyllaries 2–3-seriate, imbricate, herbaceous, the outer lanceolate, 2–3 mm long, 1–1.5 mm wide, apically acute, the inner elliptic-obovate, 3–5 mm long, ca. 1.5 mm wide, laterally chartaceous, apically acute; paleae oblanceolate, ca. 9 mm long, apically rounded, erose; ray florets 8–10, the ligules oblong to oval, 10–18 mm long, ca. 5 mm wide, the tube ca. 5 mm long, villosulose; disc florets 20–40, the corollas cylindrical-campanulate, ca. 7 mm long, the tube ca. 1.5 mm long, the lobes ca. 0.5 mm long. **Achenes** obconical, ca. 10 mm long, sericeous; pappus of 2 awns, ca. 3 mm long, readily disarticulating.

FLOWERING (AND FRUITING) PERIOD—February–April (March–May).

DISTRIBUTION AND HABITAT (FIG. 26)—KNOWN from dry, rocky slopes in the quebradas associated with the Río Mantaro in south-central Peru (1,700–3,500 m).

VERNACULAR NAMES—*Chilca negra*, *yana-chilca*.

SPECIMENS EXAMINED—**PERU.** **Ayacucho:** Huamanga, La Mejorada to Ayacucho, KM 15, *Ochoa* 574 (GH); Huamanga, Chaquihuyacco, above Ayacucho, *Tovar* 5491 (USM); Huamanga, Chanchara, Río Cachi, *Tovar* 5589 (SM), 5709 (USM). **Huancavelica:** Tayacaya, between Izcuchaca and Mariscal Caceres, *Tovar* 1378 (LP, USM).

*Flourensia peruviana* differs from *F. polycephala* in possessing much smaller phyllaries of the same shape. Its leaves are comparable in size and shape to those of *F. angustifolia*, but differ in having strictly entire margins.

18. **Flourensia polycephala** Dillon, Ann. Missouri Bot. Gard. 68: 106. 1981. TYPE: Peru, Cuzco, Calca, Pisac, April 1943, 3,000 m, *F. Marin* 231 (holotype, LIL!; isotype F!). Figures 24, 26.

**Shrubs** to 4 m; branchlets puberulent. **Leaves** lanceolate to lance-elliptic, (8–) 10–12 (–14) cm long, 1.5–2.5 (–3) cm wide, upper and lower surfaces glabrous, basally cuneate, apically acute or rarely obtuse, the margins entire, strigillose; petioles 2–5 mm long. **Capitulescences** cymose-paniculate, 4–8-headed; peduncles (1–) 3–5 (–7) cm long, bracteate. **Capitula** radiate, 15–20 mm high, 10–15 mm wide; involucre hemispheric; phyllaries 3-seriate, imbricate, herbaceous, the outer linear-lanceolate, (5–) 7–9 mm long, ca. 1 mm wide, apically attenuate, the inner rhombic, 8–9 mm long, 3–3.5 mm wide, laterally chartaceous, apically attenuate, ciliolate; paleae oblanceolate, ca. 9 mm long, apically acute to rounded, erose, ciliolate; ray florets 10–13, the ligules oblong, ca. 30 cm long, 5–6 mm wide, the tube ca. 5 mm long; disc florets 20–30, the corollas cylindrical-campanulate, ca. 7 mm long, the tube ca. 1 mm long, the lobes ca. 0.5 mm long. **Achenes** obconical, 8–9 mm long, villous-sericeous; pappus of 2 awns, ca. 3 mm long, readily disarticulating.

FLOWERING (AND FRUITING) PERIOD—January–April (March–May).

DISTRIBUTION AND HABITAT (FIG. 26)—KNOWN from dry, rocky slopes in the quebradas associated with the Río Apurímac and Río Urubamba in southeastern Peru (2,700–3,200 m).

SPECIMENS EXAMINED—**PERU.** **Apurímac:** Grau, Orpeza Valley, *Vargas* 9784 (F, UC). **Cuzco:** Calca, Hda. Urco, Vilcanota Valley, *Vargas* 683 (F, MO); Urubamba, ESE of Cuzco, *Ellenberg* 1000 (US); Huasao, *Herrera* 3098 (US); Urubamba, *Lamallva* 53 (LP); Rumichaca, *Vargas* 7597 (LIL); Chicón Canyon, *Vargas* 11053 (F, UC).



FIG. 23. *Flourensia peruviana* (from Tovar 193, F). A, habit; B, capitulum; C, disc floret.



FIG. 24. *Flourensia polycephala* (from Marin 231, F). A, habit; B, capitulum; C, disc floret.

*Flourensia polycephala* differs from the closely related *F. heterolepis* (Bolivia) in having more numerous capitula in cymose capitulescences with generally shorter peduncles. It has longer phyllaries and more ray florets than its nearest geographical neighbor, *F. peruviana*.

19. *Flourensia heterolepis* S. F. Blake, Contr. Gray Herb. n.s. 54: 186. 1918. *nom. nov.* Figures 25, 26.

*Viguiera glutinosa* Rusby, Mem. Torrey Bot. Club 4:211. 1895. TYPE: Bolivia, Cochabamba, Coch-

abamba, 1891, *N. H. Bang* 977 (holotype, NY!, photograph F; isotypes, BM!, GH!, MO!, US!). Non *Flourensia glutinosa* (Robinson & Greenman) S. F. Blake, Proc. Amer. Acad. 49: 374. 1913.

**Shrubs** to 1 m tall. **Leaves** elliptic-lanceolate to oblong-ovate, 7.5–13 (–14.5) cm long, 1.4–2.5 cm wide, upper and lower surfaces strigillose to glabrous, basally cuneate, apically acute to obtuse, the margins entire, strigillose; petioles 6–16 mm long. **Capitulescences** solitary to weakly cymose, 2–5-headed; peduncles (3–) 5–8 cm long, bracteate. **Capitula** radiate, 15–20 mm high, 10–20 mm wide; involucre hemispheric; phyllaries





FIG. 25. *Florensia heterolepis* (from Brooke 6220, F). A, habit; B, capitulum; C, disc floret.

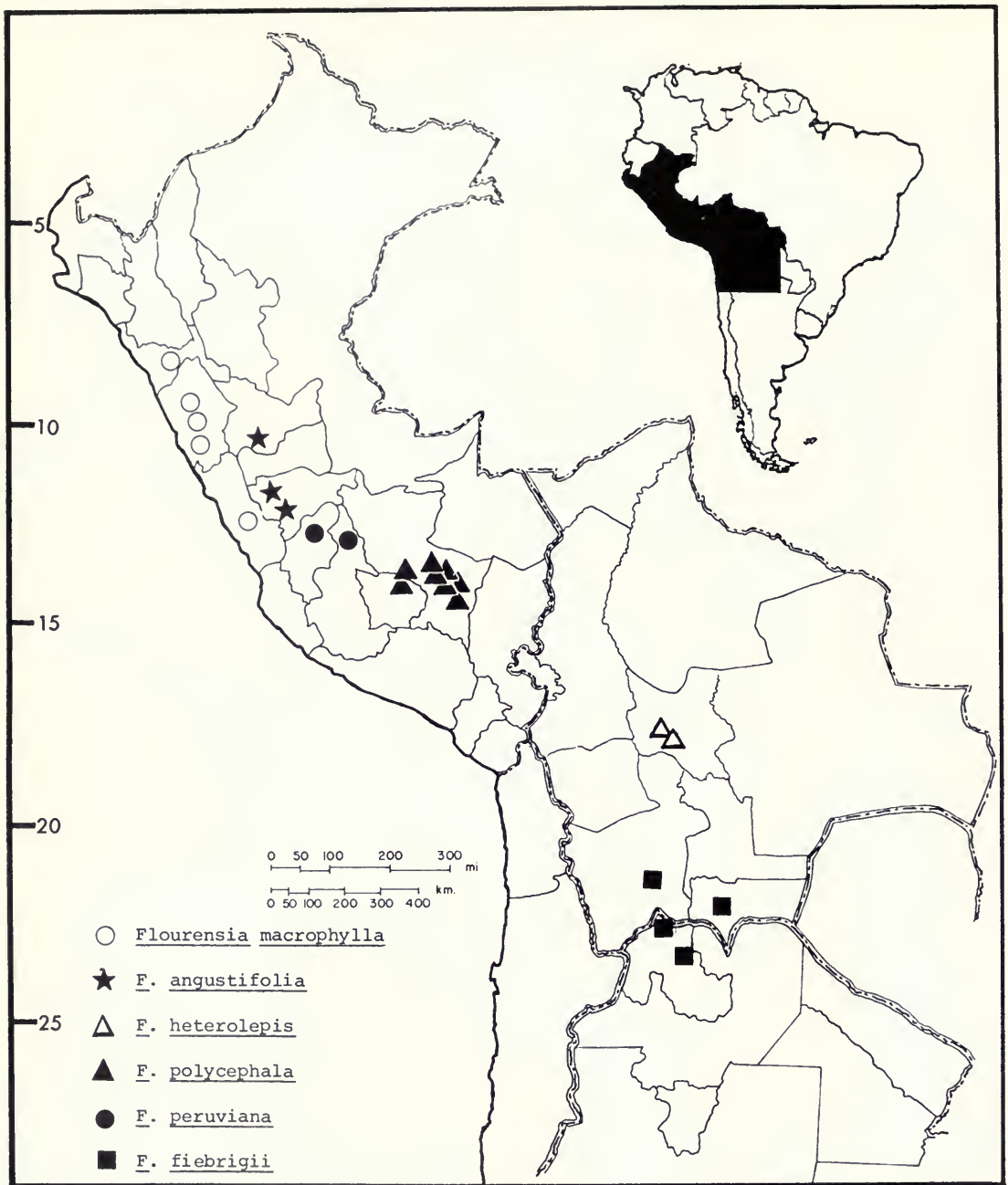


FIG. 26. Distribution of *Flourensia angustifolia*, *F. fiebrigii*, *F. heterolepis*, *F. macrophylla*, *F. peruviana*, and *F. polycephala*.

3-seriate, imbricate, the outer lanceolate, 7–9 mm long, 1–2 mm wide, apically acute, the inner rhombic-ovate, 8–10 (–11) mm long, (2–) 3–3.5 mm wide, laterally chartaceous, fimbriate, apically at-

tenuate; paleae oblanceolate, ca. 8 mm long, apically rounded to cucullate, erose to fimbriate, sometimes cuspidate; ray florets ca. 13, the ligules oblong, 15–25 mm long, 5–7 mm wide; the



FIG. 27. *Flourensia suffrutescens* (from Dillon & Rodriguez 550, F).

tube ca. 6 mm long, villosulose; disc florets 30–50, the corollas cylindric-campanulate, ca. 6 mm long, the tube ca. 1 mm long, the lobes ca. 0.8 mm long. Achenes obconical, ca. 8 mm long, villous-sericeous, faces glabrescent; pappus of 2 awns, ca. 5 mm long, persistent or disarticulating.

FLOWERING (AND FRUITING) PERIOD—November–March (February–March).

DISTRIBUTION AND HABITAT (FIG. 26)—Known from arid sites within the lower-montane, subtropical, thorny steppe associated with the Cordillera Real in western Bolivia (2,700–3,000 m).

SPECIMENS EXAMINED—BOLIVIA. Cochabamba: Vila Vila, Brooke 6220 (F); above Arani, Cárdenas 2416 (US); 50.3 km E of Cochabamba, Davidson 5050 (F); 11 km from Quillacollo, King & Bishop 7559 (F); 19 km from Tolata, King & Bishop 7585 (F).

*Flourensia heterolepis* is distinguished from *F. polycephala*, its closest relative, by its longer peduncles and fewer capitula. Its leaf size and shape are variable; some individuals have small leaves that approach those of *F. febrigii*, a species readily distinguished by its smaller capitula, phyllaries, and ray florets. Associates of *F. heterolepis* within the thorny steppe include *Acacia*, *Carica*, *Cleistocactus*, *Dodonaea*, *Nicotiana glauca*, *Schinus*, and *Solanum*.

20. *Flourensia suffrutescens* (R. E. Fries) S. F. Blake, Proc. Amer. Acad. Arts 49: 376. 1913. Figures 27, 30.

*Encelia suffrutescens* R. E. Fries, Nov. Act. Soc. Sci. Upsal. IV. 1: 83. 1903. TYPE: Argentina, Jujuy,

Moreno, rocky slope, 3,600 m, 16 Dec. 1901, *R. E. Fries* 926 (holotype, UPSV, not seen; isotype, US!).

**Subshrubs** to 40 cm tall; stems decumbent-ascending, pilose, gray. **Leaves** narrowly lanceolate to oblong, 2–8.5 cm long, 8–18 mm wide, upper and lower surfaces pilose, basally cuneate, apically acute to acuminate, the margins entire; petioles 1–3 (–5) mm long, pilose. **Capitulescences** solitary, terminal; peduncles 8–11 cm long, densely pilose, distally canescent, bracteate. **Capitula** radiate, ca. 12 mm high, 12–18 mm wide; involucre hemispheric; phyllaries 2-seriate, equal, the outer oblong-lanceolate to ovate-lanceolate, subcanescent-pilose, apically attenuate, the inner rhombic-obovate, sparsely pilose, apically acuminate, all ca. 11 mm long, ca. 2.5 mm wide, herbaceous; paleae oblanceolate, 8–10 mm long, apically obtuse to truncate; ray florets 9–15, the ligules linear-oblong to elliptic, 17–32 mm long, 4–10 mm wide, the tube ca. 5 mm long, sericeous; disc florets ca. 50, the corollas cylindrical, ca. 5 mm long, the tube ca. 1 mm long, the lobes ca. 0.7 mm long, spiculiferous. **Achenes** obconical, ca. 6 mm long, densely sericeous; pappus of 2 awns, equal 3–4 mm long, persistent. Chromosome number:  $n = 18$ .

**FLOWERING (AND FRUITING) PERIOD**—February (March).

**DISTRIBUTION AND HABITAT** (FIG. 30)—Known from scattered populations in the altiplano of Salta and Jujuy in northwestern Argentina (2,500–3,600 m).

**SPECIMENS EXAMINED**—**ARGENTINA**. **Salta**: Rosario de Lerma, Quebrada de Tastil, Las Cuevas, *Cabrera* 9002 (F); Cachipampa, *Cabrera* 22040 (LP); Puerta Tastil, *Cabrera* 22398 (LP); Cachipampa, 15 km W of Piedra del Molino, *Dillon & Rodriguez* 550\* (F, MO, NY, TEX).

*Flourensia suffrutescens* is distinguished by its small habit and large capitula with subcanescent-pilose phyllaries that equal or overtop the disc. At the Cachipampa locality, it is associated with *Larrea* at the lower end of its range (ca. 2,500 m) and becomes dominant at higher elevations and is often associated with *Baccharis boliviensis*, *Cassia*, and *Senecio*.

21. *Flourensia macroligulata* Seeligmann, Lilloa 30: 113. 1960. TYPE: Argentina, Jujuy, Volcán, Loma de las Lagunas, 15 Feb. 1924, *R. Schreiter* 2663 (holotype, LIL!). Figures 28, 30.

Rounded **shrubs** to 1.5 m tall; stems decumbent to ascending; branchlets sparsely sericeous. **Leaves** elliptic to obovate-elliptic, 7–13 cm long, 2.5–6 cm wide, upper and lower surfaces sparsely sericeous, basally cuneate to rounded, apically acute to rounded, the margins entire; petioles 5–10 mm long, the upper leaves subsessile. **Capitulescences** solitary, terminal; peduncles 4–10 cm long, sericeous, bracteate. **Capitula** radiate, 18–20 mm high, ca. 25 mm wide; involucre hemispheric; phyllaries 2–3-seriate, all lanceolate-elliptic, the outer overtopping the disc, 20–22 mm long, ca. 5 mm wide, overtopping the disc, the inner ca. 18 mm long, ca. 4 mm wide, all apically acute to obtuse, sericeous; paleae obovate, ca. 13 mm long, apically acute to truncate, sericeous; ray florets 13–21, the ligules oblong-elliptic, 25–50 mm long, 4–7 mm wide, the tube 5–9 mm long, sericeous; disc florets 50–75, the corollas campanulate, ca. 5 mm long, the tube ca. 1 mm long, the lobes ca. 0.8 mm long, sparsely pilose. **Achenes** obconical, ca. 11 mm long, densely sericeous; pappus of 2 awns, ca. 3 mm long, persistent.

**FLOWERING (AND FRUITING) PERIOD**—January–February (February–March).

**DISTRIBUTION AND HABITAT** (FIG. 30)—Known from extensive collections on the rocky, overgrazed slopes in the vicinity of the Laguna de Volcán, Jujuy, and is represented by one collection each from Tafi, Tucumán, and Tilcara, Jujuy, Argentina (2,000–3,000 m).

**REPRESENTATIVE SPECIMENS EXAMINED**—**ARGENTINA**. **Jujuy**: Volcán, *Cabrera* 12187 (LP), *Cabrera & Frangi* 20649 (LP), *Cabrera & Marchionni* 12945 (US), *Castillon* 9519 (LIL); ca. 41 km NE of San Salvador de Jujuy, *Dillon & Rodriguez* 553 (BM, F, GH, MO, NY, TEX, USM); Tilcara, *Venturi* 7402 (US). **Tucumán**: Tafi, Sierra del Cajón, *Venturi* 6284 (US).

*Flourensia macroligulata* is distinctive with its large leaves and large capitula with the largest ligules to be found within the genus.

In the vicinity of the type locality, individuals occur on very steep walls of the upper reaches of arroyos. The adjacent hillsides are overgrazed and deep erosional areas are prevalent. A local goat herder said that the goats would browse this species and have destroyed all but those individuals in inaccessible locations. I estimate the population there to be of no more than a few hundred plants. At lower elevations, the rocky slopes are covered with dense cushions of Bromeliaceae and low Cactaceae.



FIG. 28. *Flourensia macroligulata* (from Dillon & Rodriguez 553, F). A, habit; B, capitulum; C, disc floret.



FIG. 29. *Flourensia tortuosa* (from Dillon & Rodriguez 511, f). A, habit; B, capitulum; C, disc floret.

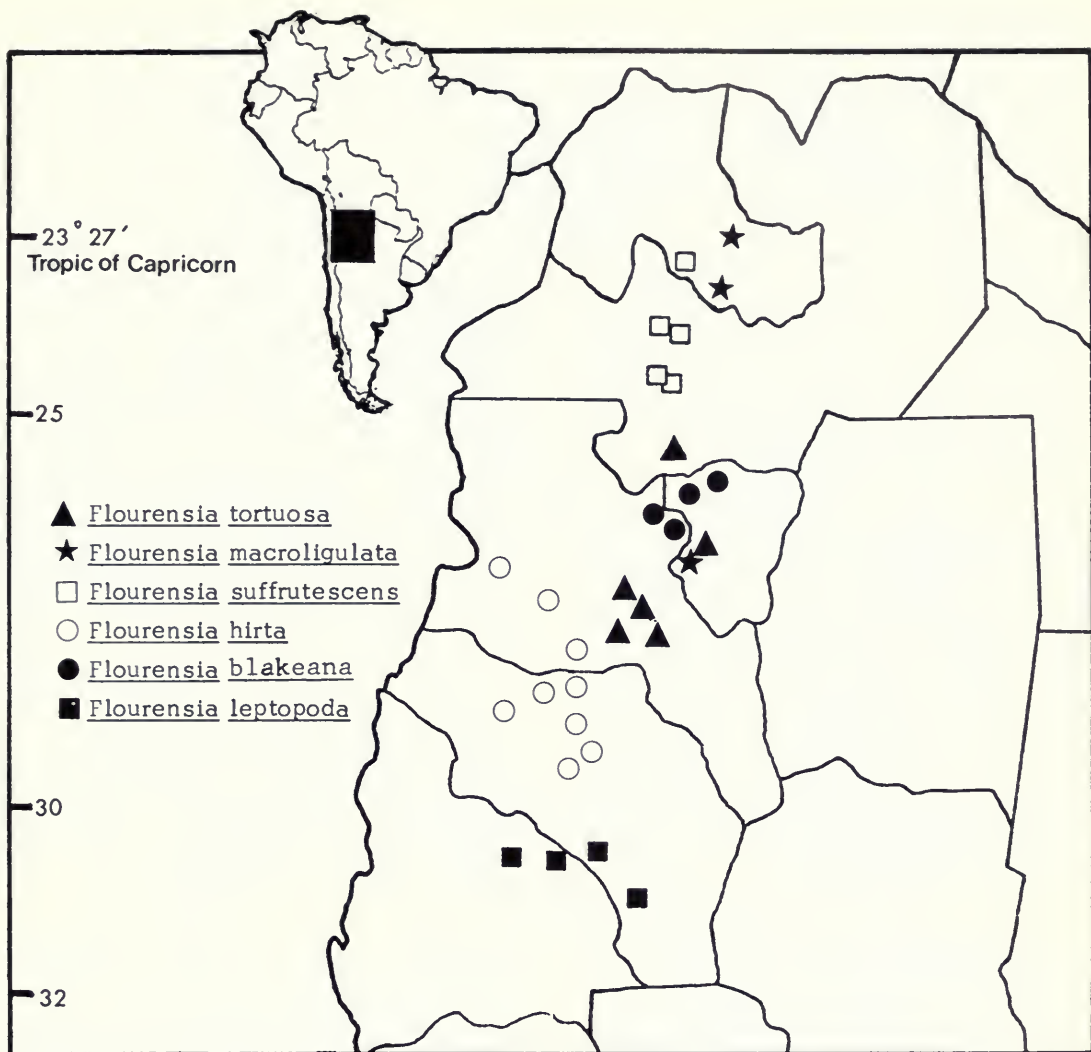


FIG. 30. Distribution of *Flourensia blakeana*, *F. hirta*, *F. leptopoda*, *F. macroligulata*, *F. suffrutescens*, and *F. tortuosa*.

22. *Flourensia tortuosa* Griseb. Abh. Königl. Ges. Wiss. Göttingen 19: 184: 1874. TYPE: Argentina, Catamarca, fields between Belén and Yacutula, 24 Jan. 1872, *P. G. Lorentz* 659 (holotype, GOET!; isotype, CORD!, photograph, F!). Figures 29, 30.

**Shrubs** to 2 m tall; stems ascending; branchlets sparsely sericeous. **Leaves** lanceolate to oval, (3-) 5-9 (-14) cm long, 1.5-3.5 (-5) cm wide, upper and lower surfaces strigillose, basally cuneate to rounded, apically acuminate to obtuse, the mar-

gins entire, strigillose; petioles 3-17 mm long. **Capitulescences** solitary or weakly cymose, 2-3-headed; peduncles 1-4 cm long, puberulent, bracteate. **Capitula** radiate, 10-15 mm high, 10-20 mm wide; involucre hemispheric, often subtended by calyculate bracts; phyllaries 2-3-seriate, equal to subequal, broadly ovate to oblong-lanceolate, (5-) 7-15 mm long, (2-) 3-7 mm wide, herbaceous, apically acute to attenuate, ciliolate; paleae oblanceolate, ca. 10 mm long, apically acute to truncate, erose-ciliolate; ray florets ca. 10, the ligules broadly oblong, 18-30 mm long, 7-10 mm

wide, the tube ca. 8 mm long, glabrous; disc florets 30–50, the corollas cylindric, 4–6 mm long, the tube ca. 1 mm long, the lobes ca. 0.7 mm long. Achenes obconical, 5–6 mm long, the margins sericeous, the faces sericeous to glabrescent; pappus of 2 awns, ca. 3.5 mm long, often bifid, persistent or disarticulating.

FLOWERING (AND FRUITING) PERIOD—January–March (February–April).

DISTRIBUTION AND HABITAT (FIG. 30)—Found on coarse sand in arroyos of upper bajadas between the Sierras de Zapata, de Anconjujia, and de Belén in south-central Catamarca; and scattered populations in central Salta and Tucumán, Argentina (1,200–3,100 m).

REPRESENTATIVE SPECIMENS EXAMINED—ARGENTINA. **Catamarca:** Andalgalá, *Cabrera 1023* (LP, US); Cuesta de Mina Capillitas, *Cabrera et al. 14140* (LP, NY); Tinogasta, Cuesta de Zapata, Tinogasta to Belén, *Cabrera et al. 16736* (LP); Londres, *Cabrera 18116* (LP); Punta de Balasto, *Cabrera 21807* (LP); 4 km N of Andalgalá, *Cantino 670* (ARIZ); Andalgalá, Cuesta de La Chilca, *Cristoba 1477* (LIL, UC); 10 km SW of Londres, *Dillon & Rodriguez 511* (F, GH, MO, NY, TEX, USM); Cerro Duraznos, *Job 1380* (LP); El Candado, *Jorgensen 1273* (GH, LIL, MO, SI, UC, US); Cerrillos, Sierra de Aconquija, *Peirano s.n.* (GH, LIL). **Salta:** Cafayate, Río Lorohausi, *Hayward 2055* (LIL); Cafayate, El Alisal, Cerro del Cajón, *Rodriguez 1341* (A, LIL, SI, US); Rosario de Lerma, Nevado to Castillo, *Venture 9271* (US). **Tucumán:** Valle Tafi, La Banda, *Castillón s.n.* (A, LIL).

*Flourensia tortuosa* has variable leaves, seemingly depending upon available moisture in respective habitats. Its phyllaries are also variable; individuals from Tucumán and Salta have narrow, oblong-lanceolate phyllaries and those surrounding the Bolsón de Pipanaco, Catamarca have wider, ovate phyllaries. Its associates include *Cercidium*, *Heliotropium*, *Larrea*, and *Senecio*.

23. *Flourensia oolepis* S. F. Blake, Contr. U.S. Natl. Herb. 20: 403. 1921. TYPE: Argentina, Córdoba, Cuesta de La Oyada, Sierra Achala, 22 March 1876, *G. Hieronymus s.n.* (holotype, B, destroyed; lectotype, here designated, fragment GH!; photograph of B specimen, F!, GH!). Figures 31, 38.

*Flourensia grindelioides* S. Moore, J. Bot. 64: 192. 1926. TYPE: Argentina, San Juan, *s.d.*, *Ms. Wright s.n.* (holotype, BM!; isotype MO!, isotype fragments GH!, US!).

Shrubs to 3 m tall, stems ascending, the bark

brown, fissured. Leaves elliptic to elliptic-lanceolate, 5.5–8.5 cm long, 2–3.2 cm wide, upper and lower surfaces glabrous, basally and apically acute, the margins entire or with 4–6 teeth apically; petioles 5–10 mm long. Capitulescences solitary or weakly cymose, 2–3-headed; peduncles 4–6 cm long, bracteate. Capitula radiate, 15–18 mm high, 15–25 mm wide; involucre hemispheric; phyllaries 3–4-seriate, imbricate, the outer broadly ovate, the inner gradually more oblong, all 5–6 mm long, 2.5–4 mm wide, subherbaceous, apically acute to attenuate, ciliolate; paleae oblanceolate, ca. 7 mm long, apically subtruncate to cucullate; ray florets 12–16, the ligules oblong, 12–28 mm long, 3–8 mm wide, the tube 4–5 mm long, sericeous; disc florets ca. 50, the corollas cylindric, 5–6 mm long, the tube ca. 1 mm long, the lobes ca. 0.5 mm long. Achenes obconical, 5–8 mm long, sericeous; pappus of 2 awns, 4–5 mm long, basally strongly ampliate and deeply lacerate, frequently united into a lacerate corona, persistent. Chromosome number:  $n = 18$ .

FLOWERING (AND FRUITING) PERIOD—September–March (January–March).

DISTRIBUTION AND HABITAT (FIG. 38)—Abundant in the regions west of the Sierras de Las Comechingones and de Córdoba in northwestern Córdoba and the Sierra de San Luis, northeastern San Luis, Argentina (1,000–2,000 m).

VERNACULAR NAMES—*Chilca gomosa*.

REPRESENTATIVE SPECIMENS EXAMINED—ARGENTINA. **Córdoba:** La Viña, *Bartlett 20615* (GH, MICH, SI, TEX, US); San Javier, *Bridarolli 1006* (LP); Sierra de Pocho, Los Túneles, *Burkart 20864* (LP); Los Cocos, *Cabrera 7* (GH, LP); 2 km S of Charbonier, *Dillon & Ariza 567\** (F, MO, TEX, USM); Sierra Grandes, Chacras, *Hunziker 2737* (LIL, SI); Los Terrones, Ongamira, *Luti 4927* (CORD, LP); Capilla del Monte, *O'Donnell & Rodriguez 356* (F, LIL); Arroyo Saltos Blancos, *Solomon & Solomon 4115* (F, MO); La Cumbre, *Sota 401* (LIL); Villa Dolores, *Varela 444* (A, LIL); Yacanto, *Vattuone 17* (SI); San Marcos, *Villafane 289* (LIL). **San Luis:** Merlos, Piedra Blanca, *Burkart 13935* (SI); Nogolí, *Gez 109* (SI); Sierra de Los Comechingones, 4 km E of Merlo, *Conrad & Dietrich 2490* (F, MO); El Volcán to Potero de Los Funes, *Nicora 4253* (SI); Sololosta, *Vignati 168* (LP).

*Flourensia oolepis* is distinguished by its short, broadly ovate phyllaries, 12–16 ray florets, and achenes with the pappus awns united basally to form a corona.

24. *Flourensia fiebrigii* S. F. Blake, Bot. Jahrb. Syst. 54: 47. 1916. TYPE: Bolivia, Tarija, slope,





FIG. 31. *Flourensia oolepis* (from Conrad 2490, F). A, habit; B, capitulum; C, disc floret.



FIG. 32. *Flourensia febrigi* (from Meyer s.n., F). A, habit; B, capitulum; C, disc floret.

summit of pass, near Paicho, W of Tarija, 3,200 m, 5 Feb. 1904, *K. Fiebrig 3050* (holotype, B, destroyed; lectotype, here designated, F!; isotypes BM!, GH!, MO!, SI!, US!). Figures 26, 32.

**Shrubs** to 50 cm tall; stems decumbent to ascending; branchlets brown to gray, puberulent. **Leaves** lanceolate to oblanceolate, 3.5–5 (–8) cm long, (5–) 7–14 (–20) mm wide, upper and lower surfaces hispid-pilose to glabrescent, basally and apically acute to acuminate, the margins entire, strigillose; petioles 2–6 mm long. **Capitulescences** solitary or weakly cymose, 2–3-headed; peduncles 1–5 cm long, hispid-pilose. **Capitula** radiate, 8–9 mm high, 7–9 mm wide; involucre campanulate; phyllaries 2–3-seriate, subequal, the outer linear-lanceolate to lance-ovate, apically acute, the inner rhombic-ovate, apically attenuate, all 4–6 (–8) mm long, 1–2 mm wide, densely to sparsely ciliate, hispid to glabrescent; paleae oblanceolate, 6–7 mm long, apically acute to truncate, lacerate, glabrous to hirsute; ray florets 7–10, the ligules oblong-oval, 11–16 mm long, 6–8 mm wide, the tube 3–4 mm long, sericeous; disc florets 10–15 (–25), the corollas campanulate to narrowly salverform, 3–4 mm long, the tube 0.5–0.8 mm long, the lobes 0.5–0.7 mm long, spiculiferous or glabrous. **Achenes** obconical, 4–6 mm long, sericeous; pappus of 2 (–3) awns, 2–2.5 mm long, basally ampliate, lacerate, persistent.

FLOWERING (AND FRUITING) PERIOD—February–March (March).

DISTRIBUTION AND HABITAT (FIG. 26)—Known from dry, rocky slopes and bajadas from the central Cordillera Real in Bolivia, and south to the Quebrada de Humahuaca in central Jujuy, Argentina (2,700–3,700 m).

REPRESENTATIVE SPECIMENS EXAMINED—**ARGENTINA**. **Jujuy**: Maimaria, Hualchin, *Budin 79* (LIL); Sierra de Zenta, *Budin 7446* (LIL, US); Tilcara, Quebrada del Chorro, *Cabrera 7672* (LP, US); Huacalera, Quebrada de La Huerta, *Cabrera 12051* (LP, US); Purmamarca, Quebrada de Huachichocana, *Cabrera 15022* (LP); Yavi, Abra de Yavi, *Cabrera 15337* (LP); Quebrada del Yocordite, *Cabrera 21262* (LP); Quebrada del Río Guasamayo, *Cabrera & Solbrig 17031* (LP); Garganta del Diablo, *Cabrera et al. 13932* (LP); Tilcara, *Cabrera et al. 13285* (LP); Yavi, 16 km E of La Quiaca, *Dillon & Rodriguez 579* (F, MO, TEX, USM); Tilcara, *Dillon & Rodriguez 587* (F, TEX); La Quiaca, *Meyer s.n.* (F, GH, LIL); Peña Alta, *Venturi 4910* (F, GH, LIL, SI, TEX, UC, US); 5 km NE of Humahuaca, *West 6318* (MO). **BOLIVIA**. **Potosí**: Atocha to Quechisla, *West 6100* (GH, UC).

*Flourensia fiebrigii* is distinguished by its small,

hispid-pilose leaves and small capitula with 7–10 ray florets. Leaf size, degree of pubescence, and growth form are quite variable. Individuals from the type locality are robust shrubs with wide leaves and sparse pubescence; to the southwest, individuals are smaller and the leaves are quite pubescent. With continued study, these forms may warrant formal taxonomic recognition. Its associates include *Baccharis*, *Cassia*, *Hoffmanseggia*, *Hymenoxys*, *Parthenium*, and *Trichocereus*.

**25. *Flourensia blakeana*** Dillon, *Ann. Missouri Bot. Gard.* 68: 108. 1981. TYPE: Argentina, Tucumán, KM 95–105 on Ruta 307, between Amai-cha del Valle and Tafi del Valle, 2,900–3,000 m, 22 Feb. 1973, *M. Dillon & E. Rodriguez 560\** (holotype TEX!; isotypes, BM!, F!, HUT!, LP!, MO!, NY!, USM!). Figures 30, 33.

**Shrubs** to 1 m tall; stems ascending, the bark gray to black. **Leaves** narrowly oblong-elliptic, (15–) 20–35 (–47) mm long, (3–) 4–8 (–11) mm wide, upper and lower surfaces sparsely strigillose, basally attenuate, apically acute, the margins entire, strigillose; petioles 1–3 mm long. **Capitulescences** cymose, 2–4-headed; peduncles 1–4 cm long, sparsely strigillose. **Capitula** radiate, 6–11 mm high, (5–) 7–10 (–14) mm wide; involucre campanulate; phyllaries 2–3-seriate, subequal, the outer linear-lanceolate, (3–) 4–6 mm long, 0.8–1 mm wide, apically attenuate, black, strigillose, the inner narrowly rhombic, 5–6 (–7) mm long, apically attenuate; paleae oblanceolate, 5–6 mm long, apically obtuse; ray florets ca. 8, the ligules oblong-oval, 10–24 mm long, 5–8 mm wide, the tube 3–4 mm long, pubescent to glabrous; disc florets ca. 25, the corollas cylindrical-campanulate, 4–5 mm long, the tube ca. 1 mm long, the lobes 0.6–0.8 mm long. **Achenes** obconical; pappus of 2 awns, 2.0–3.5 mm long, the bases ampliate, persistent. Chromosome number:  $n = 18$ .

FLOWERING (AND FRUITING) PERIOD—January–March (March).

DISTRIBUTION AND HABITAT (FIG. 30)—Frequent on sand and gravel of lower bajadas in the arid quebradas in the Cordillera Oriental of northwestern Tucumán and adjacent eastern Catamarca, Argentina (1,800–3,000 m).

VERNACULAR NAME—*Viscol*.

SPECIMENS EXAMINED—**ARGENTINA**. **Catamarca**: Santa María, Torollaco, *Reales 1056* (LIL); Pafáquillo,



FIG. 33. *Flourensia blakeana* (from Dillon & Rodriguez 560, F). A, habit; B, capitulum; C, disc floret.

*Reales 1702* (LIL). **Tucumán:** ca. 25 km NW of Tafi de Valle, *Bacon & Bohnstedt 77* (TEX); Cuesta del Infiernillo, *Cabrera & Frangi 20763* (LP); Divisadero, Cafayete-Tafi del Valle, *Carenzo 1358* (LIL); Tafi, KM 95, Los Cardones, camino del Infiernillo a Amaicha, *Legname & Vervoost 34* (NY); Machorastroja, *Schreiter 1311* (LIL); Amaicha to Santa María, *Schreiter 5636* (A, LIL); Las Arcas, *Schreiter 5637* (A, LIL); Quebrada del Chorro, *Venturi 4110* (LIL, US).

*Flourensia blakeana* is a frequent element of the xeric formation in the Cuesta del Infiernillo. It most closely resembles *F. fiebrigii* and is distinguished from that species by its smaller leaves and narrower phyllaries. It is ecologically isolated from its nearest geographic neighbor, *F. riparia*, which occurs below 2,000 m in eastern Tucumán.



FIG. 34. *Flourensia hirta* (from Dillon & Rodriguez 471, F). A, habit; B, capitulum; C, disc floret.

26. *Flourensia hirta* S. F. Blake, Contr. U.S. Natl. Herb. 20: 402. 1921. TYPE: Argentina, La Rioja, vicinity of Los Corrales, Sierra Famatina, 7 Feb. 1897, *G. Hieronymus* & *G. Niederlein* 635 (holotype, B, destroyed; lectotype, here designated, fragment GH!; photograph of B specimen, F!, GH!). Figures 30, 34.

**Shrubs** to 1.5 m tall; stems ascending; branchlets dark brown, hirsutulose. **Leaves** 3–6.5 (–7.5) cm long, 5–10 (–12) mm wide, upper and lower surfaces hirsutulose-strigillose, basally and apically attenuate, the margins entire, strigillose; petioles 1–5 mm long. **Capitulescences** cymose, 2–4-headed; peduncles 1–6 cm long, hirsutulose. **Capitula** radiate, ca. 10 mm high, ca. 8 mm wide; involucre cylindrical-campanulate; phyllaries 2-seriate, subequal, the outer linear to lanceolate, strigillose to hirsutulose, the inner narrowly ovate-lanceolate, all apically attenuate, (5–) 6–10 (–13) mm long, 1–1.5 mm wide; paleae oblanceolate, ca. 6.5 mm long, apically obtuse to acute; ray florets 5–8, the ligules oblong, 8–20 mm long, 3–8 mm wide, the tube ca. 5 mm long, puberulent, disc florets ca. 25, the corollas cylindrical-campanulate, ca. 4 mm long, the tube ca. 0.5 mm long, the lobes ca. 0.5 mm long. **Achenes** obconical, 4–5 mm long, the margins sericeous, the faces glabrescent; pappus of 2 awns, 3–4 mm long, persistent. Chromosome number:  $n = 18$ .

**FLOWERING (AND FRUITING) PERIOD**—January–March (February–April).

**DISTRIBUTION AND HABITAT** (FIG. 30)—Frequent on rocky rubble and coarse sand of bajadas and arroyos in dry quebradas associated with the Pre-Cordillera of northwestern La Rioja and western Catamarca, Argentina (1,500–2,000 m).

**SPECIMENS EXAMINED**—**ARGENTINA. Catamarca:** La Coipita, *Castellanos s.n.* (LP); road to San Francisco, KM 150–160, *O'Donnell & Meyer* 5072 (LIL); Tinogasta to Chile road, KM 85, *O'Donnell & Meyer* 5095 (LIL); Vallecito to Agua Negra, *Schreiter* 6300 (A, LIL); Cachiwayo to Puerta Negra, *Schreiter* 6398 (LIL); Las Angosturas, Río Chaschuil, *Voorst* 3150 (LIL); Caspinchango, *Reales* 1548 (LIL). **La Rioja:** El Zaguán, *Cabrera* 18048 (HUT, LP); Famatina to La Aguadita, *Cabrera* 18063 (HUT, LP); 1 km E of Puerto Alegre, *Dillon & Rodriguez* 471\* (BM, F, MO, NY, TEX, USM); Fumes Chico, Quebrada Río Bonete, *Hunziker* 2225 (LP, MO); 19 km S of Angulos, *Hunziker & Andrada* 9544 (F, USM, TEX); Valle Hermoso, La Pampa to Casa de Quincho, *Hunziker & Caso* 4260 (LP); Sierra de Famatina, Mesada de Los Pocito, *Krapovickas & Hunziker* 5179 (LP); Campanas, *Rojas Paz s.n.* (LIL); between Angulos and Campanas, *Voorst* 650 (LIL).

*Flourensia hirta* is distinguished by its narrowly lanceolate, strigillose-hirsutulose leaves and green, strigillose to hirsutulose phyllaries. Associates include *Atamisquea*, *Bulnesia*, *Larrea*, *Proustia*, *Senecio*, and *Trichocereus*.

27. *Flourensia niederleinii* S. F. Blake, Contr. U.S. Natl. Herb. 20: 404. 1921. TYPE: Argentina. La Rioja, Cuesta de Miranda, Sierra Famatina, 10 March 1879, *G. Hieronymus* & *G. Niederlein* 876 (holotype, B, destroyed; lectotype, here designated, fragment, GH!; photograph of B specimen, F!, GH!). Figures 35, 38.

**Shrubs** to 1 m tall; stems ascending; branchlets hirsutulose. **Leaves** ovate to lanceolate (2–) 3.5–4.5 (–6.8) cm long, 1.1–2.4 cm wide, upper and lower surfaces strigillose, basally cuneate to truncate, apically acute, the margins entire, strigillose; petioles 5–10 mm long, hirsutulose. **Capitulescences** cymose, 2–4-headed; peduncles 2–4 cm long. **Capitula** radiate, ca. 10 mm high, ca. 10 mm wide; involucre hemispheric; phyllaries 2-seriate, subequal, herbaceous, hirsutulose, the outer linear-lanceolate to linear-spathulate, apically acute, the inner ovate-lanceolate, apically attenuate, all 5–7 mm long, ca. 1.5 mm wide; paleae oblanceolate, ca. 7 mm long, apically subacute to rounded; ray florets ca. 8, the ligules elliptic, ca. 18 mm long, ca. 8 mm wide, the tube ca. 5 mm long, hirsutulose; disc florets ca. 30, the corollas cylindrical ca. 5 mm long, the tube ca. 0.6 mm long, the lobes ca. 1 mm long. **Achenes** obconical, ca. 5 mm long, the margins sericeous, the faces glabrescent; pappus of 2 awns, 3–4 mm long, persistent, basally ampliate, deeply lacerate. Chromosome number:  $n = 18$ .

**FLOWERING (AND FRUITING) PERIOD**—January–March (February–March).

**DISTRIBUTION AND HABITAT** (FIG. 38)—Frequent on well-drained, sandy and gravelly soils from the southern Sierra de Famatina in the vicinity of the Cuesta de Miranda and east to near Chilecito, La Rioja, Argentina (1,600–2,100 m).

**VERNACULAR NAME**—*Engordadora*.

**SPECIMENS EXAMINED**—**ARGENTINA. La Rioja:** between Chilecito and Famatina, *Cabrera* 18071 (HUT, LP); Cuesta de Miranda, 9 km E of Los Tambillos, *Dillon & Rodriguez* 475\* (BM, F, MO, NY, TEX, USM); 10 km E of Cuesta de Miranda, ca. 24 km SW of Chilecito, *Dillon & Rodriguez* 478\* (F, HUT, MO, TEX); Cuesta de Miranda,



FIG. 35. *Flourensia niederleinii* (from Dillon & Rodriguez 475, F). A, habit; B, capitulum; C, disc floret.

*Frenquelli 512* (LIL, LP); Sierra de Famatina, Cuesta de Miranda, *Hunziker & Caso 4337* (LP).

To the west of Chilecito, populations have more narrowed leaves with cuneate bases. These are represented by the following collections: ARGENTINA. La Rioja: Los Tallas, W of Chilecito, *Cabrera & Solbrig 16681* (LP); La Higuera, *Falcón & Castellanos 3667* (LP); Mina de Oro, *Meyer 4084* (F, GH, LIL, SI); Las Manza, Finca Los Bordos, *Okada 2695* (LP); Guauchin, *Venturi 7799* (A, BM, GH, MO, SI, US).

*Flourensia niederleinii* is distinguished from its nearest geographical neighbor, *F. hirta*, by its wider leaves with rounded or truncate bases and obvious petioles. Its associates include *Baccharis*, *Parthenium*, *Prosopis*, *Proustia*, and *Trichocereus*.

28. *Flourensia riparia* Griseb., Abh. Königl. Ges. Wiss. Göttingen 24: 196. 1879. TYPE: Argentina. Salta, passage of the Río Turamento, Feb. 1873, *G. Hieronymus & P. G. Lorentz 268* (holotype, GOET!; isotypes, CORD!, F!, GH!, NY!, SI!, US!). Figures 36, 38.

*Helianthus riparia* (Griseb.) Kuntze, Rev. Gen. Pl. 3: 157. 1898.

**Shrubs** to 2 m tall; stems ascending; branchlets puberulent. **Leaves** oblong-lanceolate to elliptic-ovate, 6–14 cm long, 1.5–5 cm wide, upper and lower surfaces glabrous, basally acute, apically acute to acuminate, the margins entire, strigillose; petioles 3–8 mm long. **Capitulescences** cymose-paniculate, 3–7-headed; peduncles 3–5.6 cm long, bracteate. **Capitula** radiate, ca. 11 mm high, ca. 10 mm wide; involucre campanulate; phyllaries 3-seriate, subequal, herbaceous, the outer lance-subulate, 4–5 mm long, ca. 2 mm wide, the inner lance-ovate, 6–7 mm long, 1.5–2 mm wide, all apically attenuate, ciliolate; paleae oblanceolate, ca. 7 mm long, apically obtuse to rounded; ray florets 7–10, the ligules oblong to oval, 15–20 mm long, ca. 4 mm wide, the tube ca. 5 mm long, glabrous; disc florets 25–40, the corollas cylindrical, ca. 5 mm long, the tube ca. 0.8 mm long, the lobes ca. 0.6 mm long. **Achenes** obconical, 6–7 (–9) mm long, the margins sericeous, the faces glabrescent; pappus of 2 awns, 3–4 mm long, persistent. Chromosome number:  $n = 18$ .

FLOWERING (AND FRUITING) PERIOD—January–March (February–April).

DISTRIBUTION AND HABITAT (FIG. 38)—Known from quebradas in the mountains of eastern Jujuy

and south to Catamarca, east-central Salta, and northern Tucumán, Argentina (500–2,000 m).

REPRESENTATIVE SPECIMENS EXAMINED—ARGENTINA. Catamarca: Del Alto, Balcozna, *Venturi 7169* (F). JUJUY: Santa Barbara, Cachipunco, *Cabrera et al. 17382* (LP); between Santa Clara and El Fuerte, Abra de Los Morteros, *Fabris et al. 5206* (LP). Salta: Rosario de Lerma, Chorrillos, *Cabrera 7927* (GH, LP, US); Chicoana, Quebrada Escoipe, *Cabrera et al. 21994* (LP); La Viña, Osma, *Cabrera & Marchionni 13051* (LP); Escoipe to base of Cuesta de Obispo, *Dillon & Rodriguez 538\** (F, MO, TEX); Coronel Moldes, *Hunziker 1146* (LP); Guachipas, Alemania, Arroyo Las Pavas, *Job 1518* (LP, US); Guachipas to Pampa Grande, *Meyer 21858* (LIL); El Naranjo, *O'Donnell 5330* (LIL, TEX, US); Candelaria, Unquillo, *Schreiter 94* (A, LIL); Pampa Grande, *Spegazzini 11616* (LP); Candelaria, *Venturi 3708* (LIL, SI, US). TUCUMÁN: Tranchas, ca. 25 km N of San Miguel de Tucumán, *Dillon & Rodriguez 537\** (BM, F, HUT, MO, NY, TEX, USM); Burruyacu, Sierra Nogalito, *Krapovickas & Legname 10897* (LIL); Río Nío to Alto Medina, *Legname & Cuezco 4669* (LIL); Barrancas, Vipos, *Lillo 3941* (LIL).

*Flourensia riparia* is distinguished from *F. campestris*, its closest relative, by its larger strictly entire leaves and greater number of ray florets. Its associates include *Acacia*, *Cercidium*, *Opuntia*, *Prosopis*, and *Schinopsis*.

29. *Flourensia campestris* Griseb., Abh. Königl. Ges. Wiss. Göttingen 19: 184. 1874. TYPE: Argentina, Córdoba, abundant in field SE of Córdoba, 1871, *P. G. Lorentz 245* (holotype, GOET!; isotype, CORD!, photograph, F!; isotype fragment, GH!). Figures 37, 38.

*Helianthus campestris* (Griseb.) Kuntze, Rev. Gen. Pl. 3: 157. 1889.

**Shrubs** to 2 m tall; stems erect, reddish brown. **Leaves** lanceolate to ovate, 5–9 cm long 1.3–3.4 cm wide, upper and lower surfaces glabrous, basally cuneate to rounded, apically acuminate, the margins with slight denticulations (rarely entire), strigillose; petioles (3–) 5–13 mm long. **Capitulescences** cymose-paniculate, 5–15-headed; peduncles 8–25 mm long, bracteate, puberulent. **Capitula** radiate, ca. 8 mm high, ca. 5 mm wide; involucre cylindrical-campanulate; phyllaries 2-seriate, subequal, lanceolate to ovate-lanceolate, 4–5 mm long, ca. 1 mm wide, apically attenuate; paleae oblanceolate, ca. 8 mm long, apically obtuse to truncate; ray florets 5–8; the ligules oval to oblong-oval, 7–10 mm long, 3–4.5 mm wide, the tube ca. 4 mm long, villosulose; disc florets





FIG. 36. *Flourensia riparia* (from Venturi 7169, F). A, habit; B, capitulum; C, disc floret.



FIG. 37. *Flourensia campestris* (from Dillon & Rodriguez 451, F). A, habit; B, capitulum; C, disc floret.

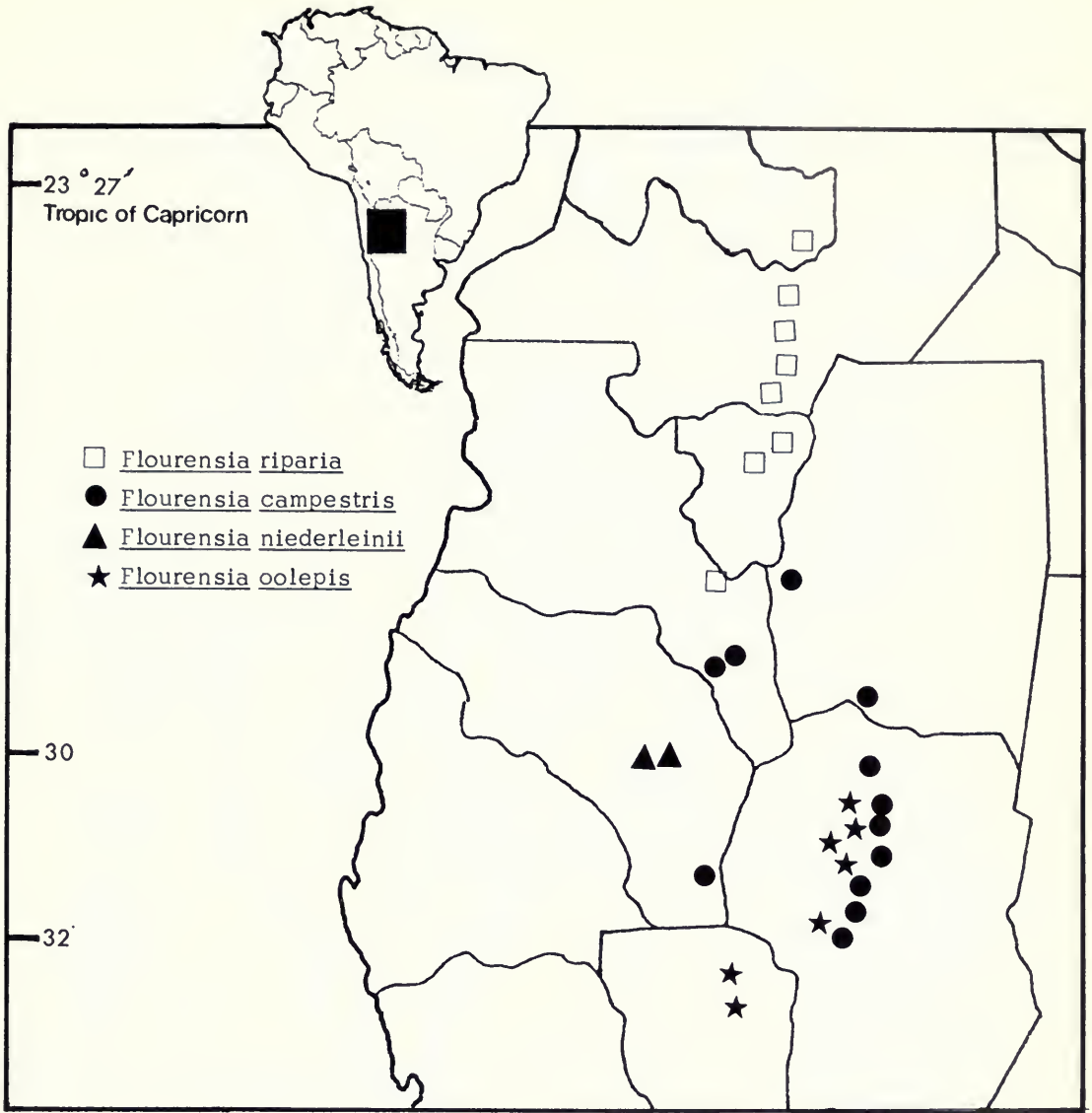


FIG. 38. Distribution of *Flourensia campestris*, *F. niederleinii*, *F. oolepis*, and *F. riparia*.

14–20, the corollas cylindric, ca. 5 mm long, the tube ca. 0.5 mm long, the lobes ca. 0.8 mm long. **Achenes** obconical, 5–6.5 mm long, the margins sericeous, the faces glabrescent; pappus of 2 awns, ca. 3.5 mm long, persistent. Chromosome number:  $n = 18$ .

**FLOWERING (AND FRUITING) PERIOD**—December–February (February–March).

**DISTRIBUTION AND HABITAT (FIG. 38)**—Known from arid sites within the Sierra de Córdoba in

northeastern Córdoba, Sierras de Ambato and Gracinana in southeastern Catamarca, and the Sierra de Guasayán in southeastern Santiago del Estero, Argentina (500–1,000 m).

**VERNACULAR NAME**—*Chilca*.

**REPRESENTATIVE SPECIES EXAMINED—ARGENTINA.**  
**Catamarca:** Ambato, 7 km S of El Rodeo, *Araque & Barkley 19Ar591* (US); El Crestón, *Castillón 1201* (LIL); Capital, *Castillón 1202* (A); La Brea, Quebrada del Tala, *Castillón 1203* (LIL); Quebrada de La Sevilla, *Dillon & Rodriguez 525\** (F, TEX); *Dillon & Rodriguez 533* (F,

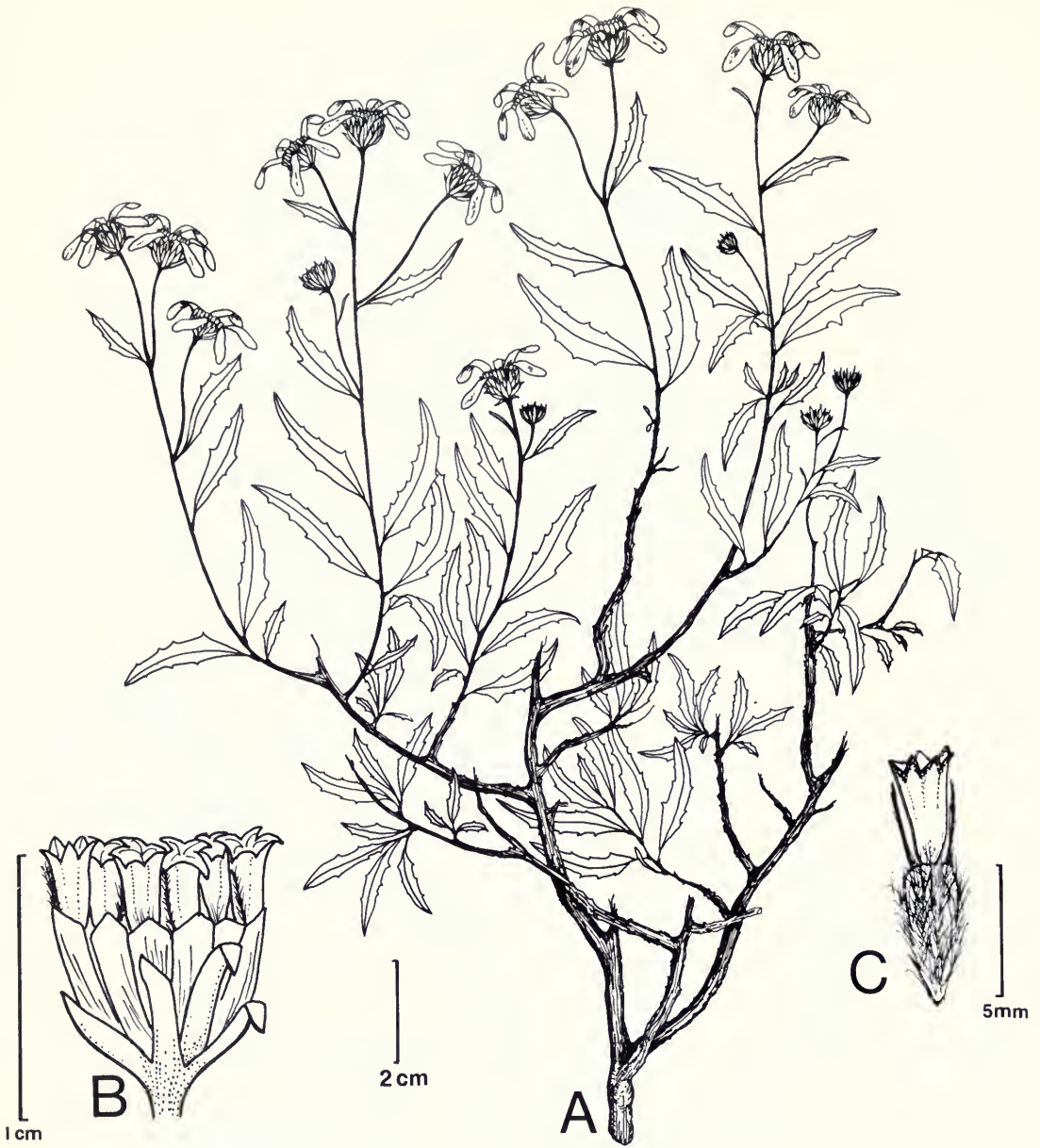


FIG. 39. *Flourensia leptopoda* (from Dillon & Rodriguez 464, F). A, habit; B, capitulum; C, disc floret.

TEX); Balcones, Sierra Ambato, Parodi 14067 (LP, US). **Córdoba:** Calamuchita, Valle de Los Reartes, Castellanos 219 (SI); Agua de Oro, Sierra Chica, Castellanos 3132 (LIL); Candonga, Dawson 1094 (GH, MO, LIL); west-facing slope of Cerro Pan de Azúcar, Dillon & Luti 565\* (F, MO, TEX, USM); near Yocsino, Dillon & Rodriguez 449\* (F, MO, NY, TEX, USM); 4 km N of Capilla del Monte, Dillon & Rodriguez 450\* (TEX), 451 (F, MO, TEX); Di-quecito, Hunziker 2747 (LIL, LP, SI); La Falda, El Chorrito, Job 440 (LP); Casabamba, Krapovickas 1903 (F, LIL);

Sauce Punco, Tulumba, O'Donnell 4536 (LIL, TEX, UC); Deán Funes, O'Donnell & Rodriguez 306 (LIL); Sierra Chica, ca. 5 km W of La Calera, Solomon & Solomon 4059 (MO); La Estancia, Minas, Sota 1725 (LIL); Sierra Chica de Córdoba, Stuckert 4269 (LIL). **Santiago del Estero:** Cerro de Quazallan, Alberli 618 (LP); Ojo de Agua, Biraben 9 (LP), Vervoort 613 (LIL).

*Flourensia campestris* is distinguished from *F.*



FIG. 40. *Flourensia hirtissima* (from Fischer 194, f). A, habit; B, capitulum.

*riparia*, its nearest relative, by its small lanceolate to ovate leaves often with slight denticulations and smaller capitula with only 5–8 ray florets. It also shares relationships with *F. leptopoda*, and collections from the southern Sierra Ambato have more pronounced leaf denticulations approaching those exhibited by the latter species. The population south of El Rodeo is exceptional in possessing reduced size (ca. 50 cm tall) and strictly entire leaves with more truncate bases. Further study may show this population worthy of formal infraspecific recognition.

*Flourensia campestris* occupies a wide variety

of habitats in the Sierra de Córdoba and is often subdominant in the more mesic sites. *Flourensia oolepis* and *F. campestris* occupy the same geographical area in northwestern Córdoba, but each is ecologically isolated in this region. *Flourensia campestris* occurs in more mesic habitats at elevations below 1,000 m; *F. oolepis*, in contrast, occurs in drier sites usually above 1,000 m. I visited populations of each species only 2–5 km apart near Capilla del Monte; however, they were never found growing sympatrically. These two species have strikingly different leaf shapes, capitulescences, and number of ray florets. Neither field

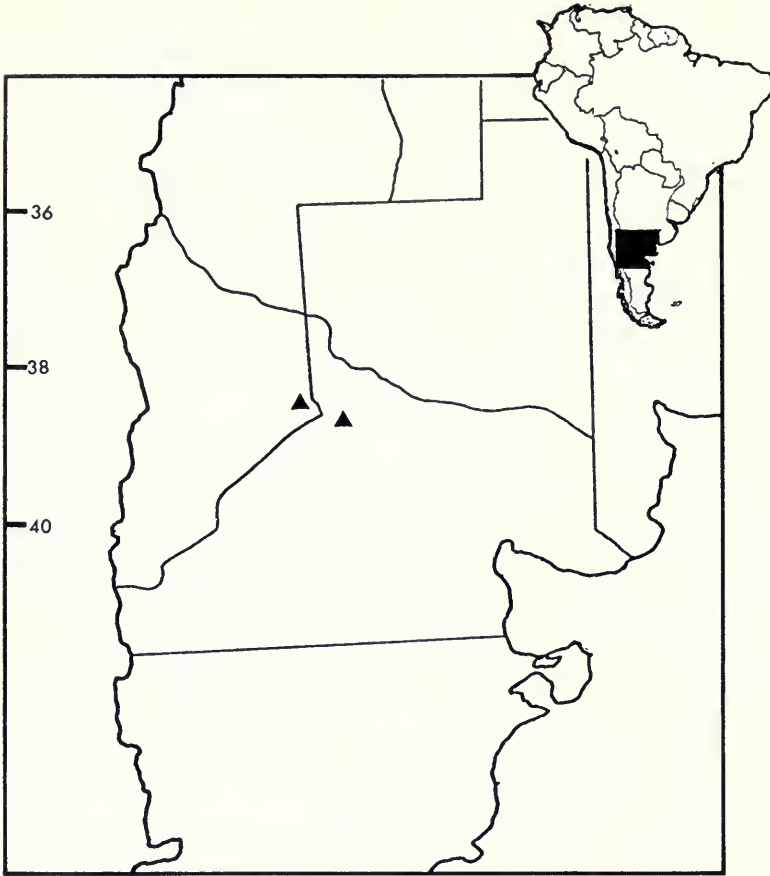


FIG. 41. Distribution of *Flourensia hirtissima*.

observations nor herbarium material examined suggest any gene flow between these two species.

Associates include *Acacia*, *Larrea*, *Opuntia*, and *Prosopis*.

30. ***Flourensia leptopoda*** S. F. Blake, Contr. U.S. Natl. Herb. 20: 406. 1921. TYPE: Argentina, La Rioja, Farrecillas, 5 March 1906, *J. S. Urliche* s.n. (holotype, B, destroyed; lectotype, here designated, fragment, GH!; photograph of B specimen, F!, GH!). Figures 30, 39.

**Shrubs** to 1 m tall; stems erect to ascending, reddish brown. **Leaves** lanceolate to rhombic-ovate, 3–4.5 cm long, 1.3–2.5 cm wide, upper and lower surfaces strigillose to glabrous, basally cuneate, apically acuminate, the margins deeply and irregularly repand-dentate, 4–6 pairs of cuspidate

teeth; petioles 2–12 mm long. **Capitulescences** cymose, 2–4-headed; peduncles 1–4 cm long, bracteate. **Capitula** radiate, ca. 8 mm high, 5–7 mm wide; involucre cylindrical-campanulate; phyllaries 2-seriate, equal, herbaceous, lanceolate to lance-subulate, 5–6 mm long, ca. 1 mm wide, apically attenuate; paleae oblanceolate, 6–8 mm long, apically attenuate; ray florets ca. 5, the ligules oblong, ca. 7 mm long, ca. 4.5 mm wide, the tube ca. 4 mm long, glabrous; disc florets ca. 10, the corollas cylindrical, ca. 5 mm long, the tube ca. 1 mm long, the lobes ca. 0.8 mm long. **Achenes** obconical, 5–8 mm long, the margins sericeous, the faces glabrescent; pappus of 2 awns, 3–4 mm long, persistent. Chromosome number:  $n = 18$ .

**FLOWERING (AND FRUITING) PERIOD**—February–March (March–April).

**DISTRIBUTION AND HABITAT (FIG. 30)**—Known

from sandy gravelly soils in arroyos of south-central La Rioja and adjacent San Juan, Argentina (1,500–1,700 m).

**SPECIMENS EXAMINED—ARGENTINA. La Rioja:** Aguadita, Sierra de Olla, *Castellanos 34021* (LIL); Iglesia, *Frenguelli 508* (LIL); Sierra de Ulapes, *Stuckert 17148* (LIL). **San Juan:** Valle de La Luna, near Ischigualasto, *Dillon & Rodriguez 464\** (BM, F, GH, HUT, MO, NY, TEX, USM); Quebrada de Gualcamayo, *Chepical to El Salto, Roig 18965* (LP).

*Flourensia leptopoda* is distinguished by possessing rhombic-ovate to lanceolate leaves that are all deeply repand-dentate and capitula with 5 ray florets. Populations on the northern side of the Sierra del Valle Fertil in northeastern San Juan possess narrower leaves with larger denticulations. Its associates include *Bulnesia*, *Halophytum*, *Echinocactus*, *Laurea*, *Opuntia*, and *Prosopis*.

31. **Flourensia hirtissima** S. F. Blake, *Contr. U.S. Natl. Herb.* 22: 629. 1924. TYPE: Argentina, Río Negro, General Roca and vicinity, on conglomerate, 250–360 m, 31 Dec. 1914, *W. Fisher 194* (holotype, US!; isotypes, BM!, F!, GH!, MO!, NY!, SI!). Figures 40, 41.

**Subshrubs** to 20 cm tall; stems erect; branchlets pilose-hirsute to glabrate, gray-brown. **Leaves** narrowly linear-lanceolate to linear-oblong, 18–48 mm long (including petioliform base), 2–4 mm wide, upper and lower surfaces densely hirsute, basally and apically attenuate, the margins entire, narrowly revolute. **Capitulescences** solitary, terminal; peduncles 4–7 cm long, densely pilose-hirsute. **Capitula** radiate, 12–17 mm high, ca. 10 mm wide; involucre campanulate; phyllaries 2-seriate, subherbaceous, subequal, the outer phyllaries linear to lanceolate, 3–5 mm long, ca. 1 mm wide, apically acute, sparsely to densely hirsute, the inner lance-ovate, 6–9 mm long, ca. 2 mm wide, apically obtuse, densely hirsutulose-ciliate; paleae oblanceolate, 7–10 mm long, apically obtuse, densely hirsutulose; ray florets 5–8, the ligules oblong-oval, ca. 10 mm long, ca. 5 mm wide, the tube ca. 5 mm long, hirsutulose; disc florets 10–15, the corollas cylindrical, ca. 6 mm long, the tube ca. 1.5 mm long, the lobes ca. 0.7 mm long, spiculiferous. **Achenes** cuneate-oblong, ca. 6 mm long, densely sericeous; pappus of 2 awns, ca. 5 mm long, persistent.

**FLOWERING (AND FRUITING) PERIOD**—November–December (December).

**DISTRIBUTION AND HABITAT** (FIG. 41)—This rare species is known only from the type locality and one additional collection from eastern Neuquen. Label data indicate that it occurs on limestone conglomerate on mesas and low hills. Cabrera (1971) cited the second-known collection (*Perez-Moreau 3166*, PAB) from Zapala, Neuquen; I have not examined this collection.

*Flourensia hirtissima* is distinguished by its reduced habit, hirsute leaves, and solitary capitula with densely hirsute phyllaries.

#### Doubtful and Excluded Taxa

- Flourensia atacamensis** (Philippi) Reiche, *Ann. Univ. Chile* 112: 146. 1903. *Helianthus atacamensis* Philippi, *Anal. Mus. Nac. Chile Bot.* 1891: 48. 1891. TYPE: Chile, Antofagasta, Atacama, *F. Philippi s.n.* (holotype, v, destroyed; photograph of v specimen, f!). = *Viguiera pazensis* Rusby, *Contr. Gray Herb.* 54: 141. 1918.
- Flourensia corymbosa** DC., *Prodr.* 5: 592. 1836. TYPE: Chile, Bío-bío, stoney fields near Antuco, Jan. 1830. *E. F. Poeppig 791* (holotype, G-DC, not seen, IDC Microfiche 800. 952: I. 2!; isotype, f!). = *Viguiera revoluta* (Meyen) S. F. Blake, *Contr. Gray Herb.* 54: 121. 1918.
- Flourensia corymbosa** var. **araucana** (Philippi) Reiche, *Anal. Univ. Chile* 112: 145. 1903. *Helianthus araucanus* Philippi, *Anal. Univ. Chile* 90: 39. 1895. TYPE: Chile, *s.d.*, *F. Philippi s.n.* (holotype, v, destroyed). Blake (1918) examined the type material at v and determined it to be *Viguiera revoluta* (Meyen) S. F. Blake, *Contr. Gray Herb.* 54: 121. 1918.
- Flourensia corymbosa** var. **lanceolata** (Meyen) Reiche, *Anal. Univ. Chile* 112: 144. 1903. *Helianthus lanceolatus* Meyen, *Reise um die Erde* 1: 311. 1834. TYPE: Chile, *s.d.*, *F. J. F. Meyen s.n.* (holotype, v, destroyed). Blake (1918) examined the type material at v and determined it to be *Viguiera revoluta* (Meyen) S. F. Blake, *Contr. Gray Herb.* 54: 121. 1918.
- Flourensia gayana** (Philippi) Reiche, *Anal. Univ. Chile* 112: 145. 1903. *Helianthus gayanus* Philippi, *Anal. Univ. Chile* 90: 39. 1895. TYPE: Chile, *s.d.*, *F. Philippi s.n.* (holotype, v, destroyed). Blake (1918) examined the type material at v and determined it to be *Viguiera revoluta* (Meyen) S. F. Blake, *Contr. Gray Herb.* 54: 121. 1918.
- Flourensia hispida** Philippi, *Anal. Univ. Chile* 36: 186. 1870. TYPE: Chile, *s.d.*, *R. A. Philippi s.n.*

(holotype, B, destroyed; lectotype, here designated, W, not seen; photograph F!). = *Viguiera gilliesii* (Hook. & Arn.) Hieron., Contr. Gray Herb. 54: 119. 1918.

**Flourensia navarri** (Philippi) Reiche, Anal. Univ. Chile 112: 145. 1903. *Helianthus* (*Flourensia*) *navarri* Philippi, Anal. Univ. Chile 90: 37. 1895. TYPE: Chile, s.d., *F. Philippi* s.n. (holotype, B, destroyed). Blake (1921) examined the type material at B and determined this species to be a *Wedelia*.

**Flourensia polyclada** S. F. Blake, Contr. U.S. Natl. Herb. 20: 403. 1921. TYPE: Argentina, La Rioja, entre La Cueva y La Encrucijada, Sierra Famatina, 29 Jan.–3 Feb. 1879, *G. Hieronymus* & *G. Niederlein* 541 (holotype, B, destroyed; isotype fragment and photograph, F!, GH!). No additional type material has been located, and no collections examined in the present study match the description. It may be a synonym of *Flourensia fiebrigii* Blake; however, this would mark a considerable southward range extension for that species.

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Names in Roman type refer to valid species; names in *italics* refer to synonyms. Numbers in **boldface** refer to descriptions; numbers in *italics* refer to illustrations.

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